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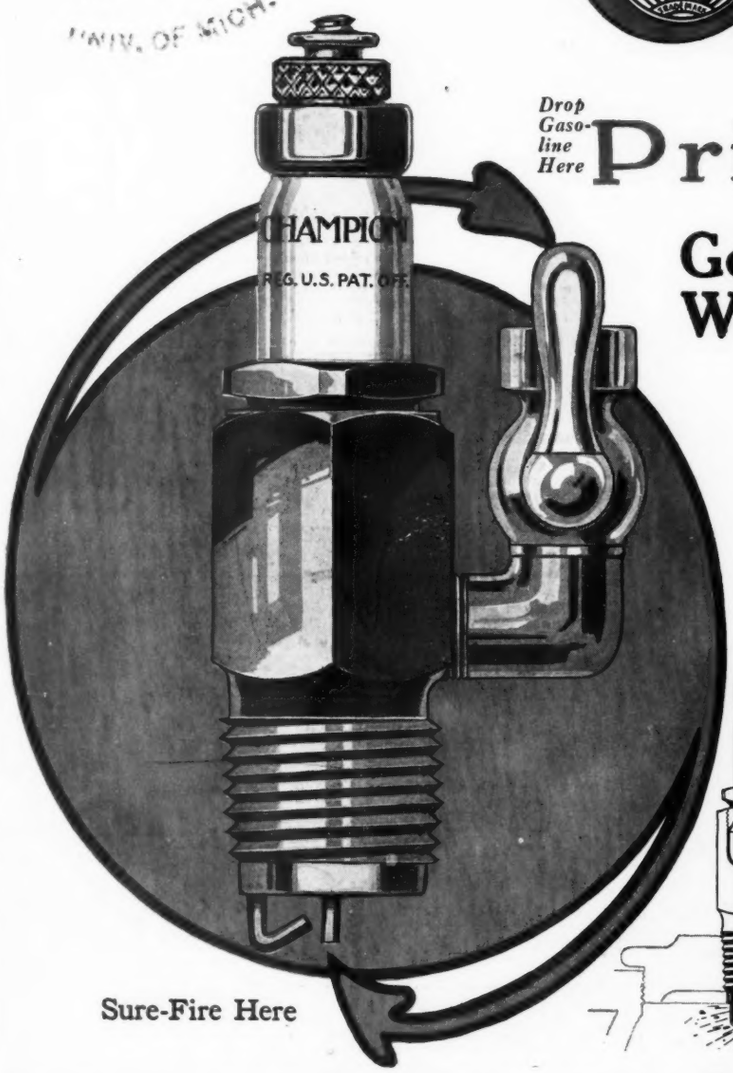

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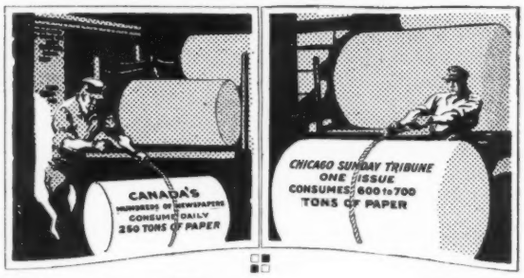

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AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

VOL. XLI NEW YORK—THURSDAY, OCTOBER 23, 1919—CHICAGO No. 17

British Tractor Trials Get Grip On Farmers

In this comprehensive report, Mr. Bourdon, in his double capacity as a writer and an engineer, has shown how the Lincoln exhibition was made a success, telling how it was differentiated in results from trials in this country—It is one of the most important articles on the tractor published in recent months

By M. W. Bourdon*

CONSERVATIVE estimates of the average daily attendance of spectators at the British Tractor Trials (Sept. 24-27) put the figure at 15,000, and 90 per cent of the 60,000 visitors were unquestionably farmers or at least interested in agriculture. There need be no hesitation in saying—so well were the trials conducted and so excellently did the majority of the tractors do their work—that a great impetus has been given to the tractor industry in Great Britain. Farmers who went to criticize, expressing on arrival emphatic disbelief in the use and serviceability of tractors on their small fields, went away deeply impressed. The difference in their views was due not only to the performances of the machines but also to the evident excellence of the plowing.

It was clear that the war has broadened the mind of the average British farmer. In thousands of cases, his sons in the army made close and even intimate acquaintance with different forms of mechanical haulage and have returned to the farm with a knowledge of internal combustion engines that they desire to put to practical use in agriculture. The farmer's enforced use of British Government tractors during the war opened his eyes to the possibilities of this form of plow haulage. Despite the mishandling of the machines by inexperienced drivers, the poor organization of the Board of Agriculture in this connection and the use of improper plows and other handicaps, the tractors that were sent out by the British Government in 1917 and 1918 to increase the acreage under tillage at least accustomed the proverbially conservative British farmer to the sight of them.

At all events, most of the farmers who visited the operations at Lincoln went away with some experience of tractor plowing. The trials have done an immense amount of good and will induce innumerable sales,

Correspondent of Automotive Industries in the United Kingdom.

either immediately or within the next one, two or three years.

Of the 37 tractors that started on the first day's work on heavy land, all but three, the Alldays, Pick and Maskell, worked satisfactorily. The Alldays was late in starting and then had trouble with a badly set plow which led to its retirement for the day; the Pick broke a driving dog, and the Maskell choked up its driving wheels with earth, having insufficient clearance with the stakes first used.

The tractors, then, did themselves credit but the same can hardly be said of all the plows, and the opinion was freely expressed that, good though the work was, it could have been improved upon in many instances by the use of plows more suited to the class of land and the speed of plowing. In the heavy land, the long breast of the Ransome (British) implement did uniformly good work but digger plows were badly needed in the light land and many stops were called for in some cases to clear the breasts of the plows from weeds and stubble. One or two entrants used on the light land a type of plow different from that used on the heavy soil but the majority made shift with the same implement on both grades of land.

The use of the best implement constitutes a point to which tractor manufacturers should give more attention in such trials. The farmer cannot apparently differentiate the quality of the work done from the tractor, whereas it was clearly evident that bad work at Lincoln was due to a badly set or unsuitable plow. There is unquestionably an opening for plows of more suitable design and better material. They should be far more readily adjusted than is the case now, being an engineer's and not a blacksmith's job.

There was a marked difference of opinion among practical agriculturists present as to the desirability of the tractor running with the wheel or wheels of one side in the furrow. The tractor manufacturer or designer seeking advice on this point from practical farmers could not obtain much enlightenment and was left to use his machine as his own inclination led him.

There was some lack of foresight and business acumen on the part of the makers or importers of many of the tractors. The machines were followed by spectators—the majority potential buyers—numbering up to 200 in some cases, but sales representatives were conspicuous by their absence. At any rate, many cases occurred within the writer's knowledge of farmers, seeking specific information as to deliveries and even desiring to place orders, being unable to find anyone with whom they might discuss such matters. The organizers did their part well and it was a pity that some entrants did not take full advantage of the opportunities for business that were laid open to them.

The exhibition of tractors, implements, trucks and accessories that was held simultaneously in aeroplane hangars and canvas tents was thronged each day by visitors and good business was reported. Motor buses, charabancs seating 40 people and every class of hired and private motor conveyance imaginable brought the spectators from Lincoln and elsewhere. Refreshments were to be obtainable in four different parts of the trials ground but the number of visitors was apparently a surprise to the management and the arrangements for catering did not fulfill all the requirements that might be asked.

The underlying idea of the trials, as expressed by the organizers, the Society of Motor Manufacturers and Traders, was that the time had gone by when it was necessary to demonstrate the advantages of a tractor; the trouble being that there are so many types on the market that the farmer is at a loss to decide which is most suitable for his use, and the manufacturers and importers felt, therefore, that it was up to them to find some practical way of helping the farmer to make the right choice. There is a tractor to suit every farm. The object of the trials was to find that tractor for every farmer.

Almost every motor plow and tractor on the British market was represented, and demonstrated, during three days, its capacity for plowing and cultivating. Many, in addition, showed that they could drive threshing machines and haul loads along the road.

The cautious buyer naturally likes to have some expert assistance to confirm his personal judgment. The Society, therefore, sought assistance from the National Farmers' Union, which agreed to appoint judges, and six members of the Council of the Union, all successful practical farmers, consented to act in that capacity. Further, in order that the engineering side should not be neglected, a prominent consulting engineer, who specializes in tractor design, was engaged to make exhaustive examination of the structural features of the tractors. The judges were to report fully on the performance of the machines, the engineer reporting as to their mechanical features. The Society will not award any prizes or medals to the best tractor.

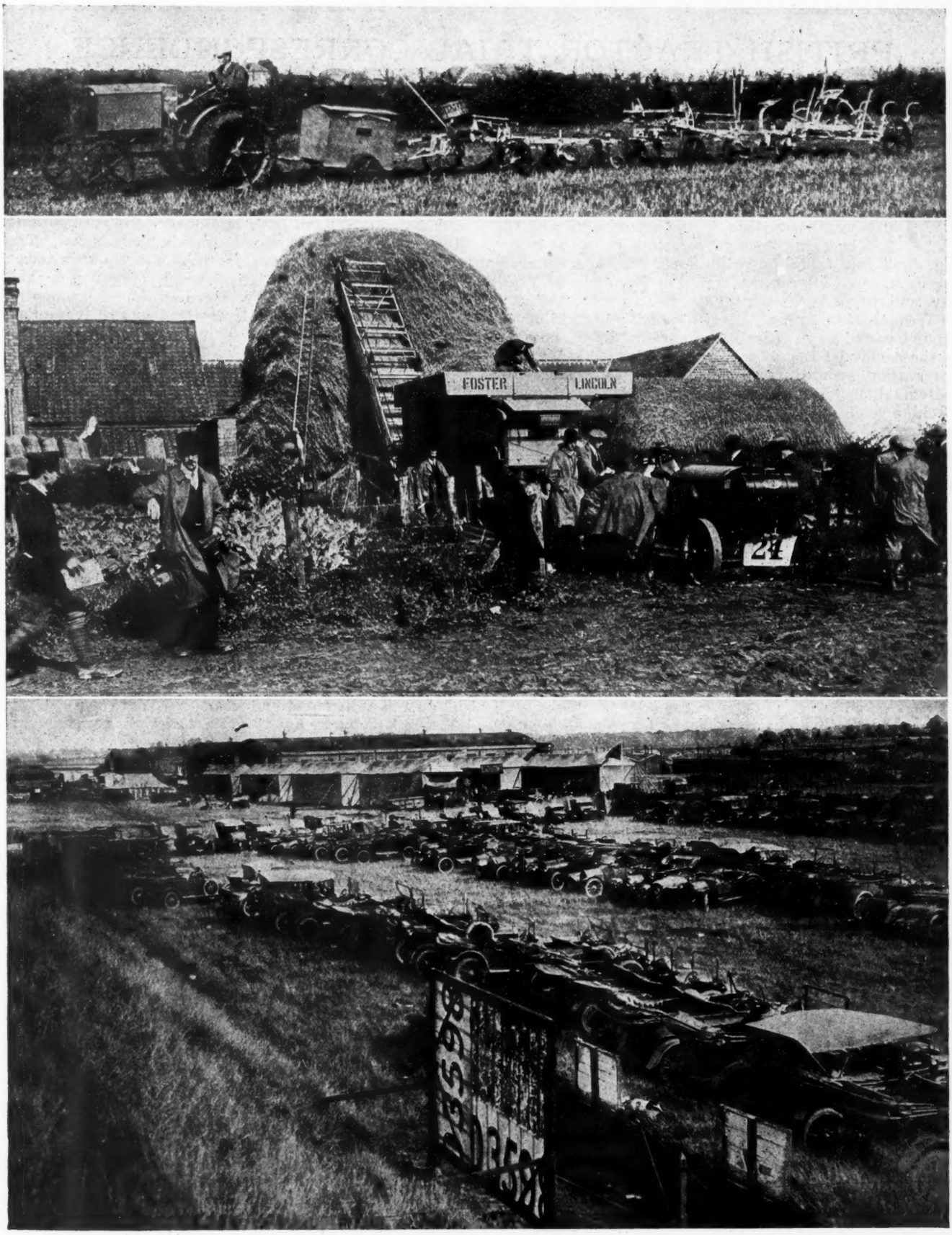
The trials were held in the center of a district well known for high-class farming, about three miles from the cathedral city of Lincoln, which is renowned for the manufacture of agricultural machinery. The first steam threshing machine was designed and built in 1845 at Lincoln and here, too, the original types of the famous British "tanks" were chiefly designed and manufactured.

On Wednesday, the scene of operations was some low-lying heavy land, for the most part what is known by farmers as three to four-horse land; that is, it necessitates three or four horses to draw a single plow. It was in good condition for plowing, recent rains had not made it badly water-logged and had certainly prevented it from becoming as hard as this heavy clay soil often does after a spell of dry weather.

The lighter soil plowed on Thursday and on Friday morning was on a tableland some 200 feet above the previous day's plowing grounds. From one part to the other, the country rises abruptly in about half a mile. The high ground, viewed from below, has the appearance of a cliff extending beyond view in each direction.

The fields were practically flat and were large, as fields go in England, being between 25 and 40 acres for the most part, and giving a length of furrow ranging from 220 to 880 yards. Also, they were regular in shape, without the many awkward corners and angles that are so frequently found in the fields of other parts of Great Britain.

General Views of the British Tractor Trials



The upper view shows a Weeks-Simplex towing its implements. A tractor is operating a thresher in the middle picture, while the lower shows a general view of part of the exhibit buildings and tents, with some of the visitors' cars

BRITISH TRACTOR TRIAL CORRESPONDENCE

Performances on Heavy Land

ON THE first day, the heavy land was plowed in fine weather with a fresh drying wind and the sun breaking through occasionally in the morning. Rain had fallen for many hours on the two preceding days, especially on the nights of Monday and Tuesday, and, in parts, certain of the fields were rather wet on Wednesday morning. The state and heaviness of the ground varied so greatly in the various fields and even in the same plot that it was almost impossible by mere observation mentally to compare the performances of individual machines. In the length of a single furrow, a machine would make light work over one stretch and yet be barely able to deal with its load at another part.

The majority of the machines made a favorable impression on the farmers present. The Glasgow three-wheel, three-track machine driving through all wheels, was well received. It used gasoline as fuel and its apparent simplicity, excellent adhesion and manouverability appealed to observers, although in the heavy land it appeared to have a full load with a three furrow 10x5 in. plow and another inch of depth would probably have been more than it could have managed. In regard to the steering and drive through the two front wheels, this gave rise to no disability and, at the 6 yd. headlands, the inner front wheel and the rear wheel served to transmit the drive without difficulty, while the outer wheel overran on its ratchet and pawl device, no differential being fitted.

The Alldays (British) was delayed for over an hour in starting on the first day through the non-arrival of its plow, special strakes for the driving wheels, and vertical flanges for the steerers. Without the latter fitting the machine could not maintain steerage satisfactorily with its four-furrow 10x6 in. plow. Later it was withdrawn for the day by reason of a poorly set plow resulting in bad work.

The two Austins plowing in heavy land and using kerosene made quite a fair showing with three-furrow 9x6 in. plows; one, cutting a poor leading furrow at the offset, made light work of its load but the other, turning a good clean sod from all breasts, was called upon to exert its utmost. These machines ran with one front and one back wheel in the furrow with a central pull on the draw link.

The 28 h. p. Avery (American), while not having the neat and workmanlike external appearance of the majority of its competitors, did remarkably well, nearly completing its allotted portion in the first three hours plowing with a three furrow 9½x5 in. Cockshutt self-lift plow.

The Clayton chain track machine made an impressive showing, running easily on kerosene, with a four furrow Ransome plow 9x5½ in. It was manouvered cleanly and well at the headlands and gained excellent adhesion from its 14 in. tracks. One criticism of this machine made on the spot by a farmer user, and one, too, which would seem to apply with similar force in connection with certain other chain track machines, is that the weight-bearing idler wheels of the track do not stand up to their work, being either too small in diameter and with guiding flanges too narrow, or made of unsuitable material. The farmer in question said that, while the tracks themselves were apparently good for considerably more use, he had had to renew the idler wheels in less than four months work. They were comparatively inexpensive to replace but the time and trouble of fitting the renewals was begrudged.

The Chain Track Blackstone

The Blackstone (British) chain track machine also behaved well, hauling a 3-furrow 9x5 in. plow with ease in a field which had some exceedingly heavy patches, although the engine—a three-cylinder with fuel injected by a pump and mixed with air entering from a compressed air chamber at 80 to 90 lb. pressure—misfired rather noticeably at times. This machine had a companion in a wheel type tractor with a similar engine but the latter machine did not reappear after the dynamometer tests on Monday. It is doubtful to the writer whether this type of engine will survive the rough and unskilled usage to which a farm tractor is put; air compressors and check valves operating under 300-lb. pressure (for engine starting purposes) would hardly seem to be desirable accessories in the hands of the farm mechanic, while the injector pumps for kerosene charging must be very susceptible to mal-adjustment and wear.

The 18 h.p. and 29 h.p. Case tractors were non-starters, but two-chain track Clevelands using kerosene were operated, although one was called off temporarily by the stewards owing to bad plowing, due entirely, so it would seem, to an incorrectly adjusted plow. That the irregularities were in no way ascribable to the tractor was evident from a comparison with the work of its companion, which, operating alongside in the same field, made no fuss while hauling a 10x5 in. two-furrow plow with good results.

One of the machines which made light work of its task, using gasoline, was the Crawley (British) self-contained motor plow, which raced along with its three 9x6 in. plow breasts at nearly 3 m.p.h. It was clear, too, that in the hands of a skillful driver the Crawley could be manouvered either backward or forward with remarkable ease and rapidity at headlands. In every way this machine made an impressive performance. It ran with one of its two wheels in the furrow.

The Emerson, using kerosene, performed creditably in dealing with some heavy soil with a 10x6 in. three-furrow Cockshutt implement, while the Eros tractor unit on a Ford chassis was the subject of favorable comment by the farmer visitors. It hauled a 10x6 in. two-furrow Speedy plow and ran on gasoline in a field where the soil, although patchy, was on the whole lighter than the majority of the heavy land dealt with.

The Fiat was exceptionally well received by the great many experienced farmers, who crowded around it nearly

The Saunderson loading a log wagon by means of its winding gear

The Austin with rubber pads on wheels in hauling test

The Maskell was early in trouble on the first day with choked driving wheel, owing to insufficient clearance for heavy soil that hung to the diagonal strakes

A successful novelty of the trials. The Glasgow with three wheels—all drivers. Ratchet and pawl device in each front wheel displaces differential

all day. It ran with two wheels in the furrow, hauling a 3 breast 10x5 in. self-lift plow. The attendant in charge was besieged by enquirers as to price, but was unable to quote even an approximate figure. It ran on kerosene, with a light fabric blind in front of its radiator for a considerable part of the day; it was equipped with a water air cleaner and was one of the first machines to finish its allotted day's work.

The two Fordsons carried on satisfactorily, though one was hard pushed at times in drawing through some very heavy soil its 10x5 in. two-furrow Oliver plow; occasionally bottom gear was needed, though the middle ratio was in use most of the time with the engine pulling hard. Qualified observers freely expressed the opinion that this particular machine would have made a better showing, by turning over a bigger acreage, if a 9 in. furrow had to be made. The other machine had a slightly lighter soil to deal with and was appreciably faster than its fellow; both burned kerosene.

The friction-driven G.O. kept at work in a field in what was admittedly the heaviest land of the trials; at times a stop was compelled and a restart was made after an acceleration of the engine and clutch manipulation, and it was clear that the machine was asked to do more than was fair to it in turning over three 10x5½ in. furrows.

The Gray tractor, unique at the trials by reason of its rear driving drum 54 in. wide and 54 in. diameter, made exceptionally light work of four furrows 10x6 in., and the 30 h.p. Mogul, hauling a four-furrow riding plow 9x6, with all wheels on the unplowed land, kept steadily at work, although called upon to exert its utmost on certain parts of a heavy field. As a matter of fact, all the machines entered by the International Harvester Co. behaved well and were favorably received, the Titans in particular, as old friends, by the farmers present. The International Junior with its 4x5 in. four-cylinder engine running at 1,000 r.p.m. and burning kerosene, formed a striking contrast with its stablemates. It easily dealt with two 9x6 in. furrows in a field which, it must be admitted, had some of the lightest soil turned during the day, though with patches of what the British farmer terms two-to-three-horse land. The Titans had 3-furrow 10x5 in. International plows and, running on kerosene, kept steadily at work.

The Mann steamer (British), despite its having a greater drawbar pull than any other tractor in the trials, did not do itself credit, failing at times by reason of poor adhesion. During the morning one breast of the five-furrow plow with which it started was removed to give it a better chance of working regularly.

Both of the British Martin machines made a good impression. They were fitted with identical engines, but one tractor was of the chain track type and the other of the four-wheel two-track variety. The creeper hauled a three-furrow 9x5 in. plow with ease and manouvered at the headlands in excellent form. It and its fellow both ran on kerosene with a clean exhaust; in fact, one noticeable feature was the good vaporization of kerosene on nearly all the machines using that fuel. The plow depth of the self-contained chain track machine is easily adjusted, as was shown when a slight alteration was made a few minutes after the start; it ran with one track in the furrow and one on the unplowed land, and the same applies to the driving wheels of its companion machine. The latter was at work with the G.O., Clayton and Gray in field B, which contained some of the heaviest land of the day and hauled its 10x6 three-furrow plow without difficulty, except in some of the exceptionally heavy patches. An interesting comparison should be possible, when the judges' report is available, as to the behavior of these fellow Martins, for, as both ran on kerosene, had the same size of engine and came from the same works, all differences other than those due to transmission and final drive are ruled out.

The Maskell was early in trouble on the heavy land by reason of insufficient clearance around its driving wheel or roller and much time was wasted in altering the diagonal strakes and clearing the soil. One of the Molines ran on gasoline and had no difficulty in dealing with its three 10x5 in. furrows. This was the only machine noticed with an electric lighting and engine starting equipment, and, as a super-refinement, a Remy electric governor on the throttle.

The Omnitractor, another British machine using kerosene, operated well, but like the American Avery, did not appeal to observers from the point of view of clean and compact design. Strangely enough, these two machines made exceptionally good performances, the English machine drawing a three-furrow 10x6 in. Howard rider plow without fuss through very heavy soil.

The Overtime, burning kerosene, had an allotment in a field in which some comparatively light land occurred, though heavy patches did not hold it up with its four-furrow 10x6 in. self-lift plow. Its good reputation among British farmers was undoubtedly enhanced by its performance.

With the Glasgow, the Pick (using gasoline) shared the distinction of being unique in general arrangement but it was unfortunately prevented from showing at its best by being compelled to operate on too high a gear ratio and retired after covering its length of field some three times each way. In the preceding day's dynamometer tests, it had broken three out of four of the dog teeth of the low speed clutch gear and this fact was not realized until an hour or so before plowing commenced, then too late for replacements to be obtained on that day. It was considered unwise to attempt to operate on low with only one dog tooth remaining, so an hour's running was done on high with evident disadvantage.

The Saunderson (British) machines worked steadily and well, one operating with two wheels in the furrow and the other with all four on the unplowed land. The latter, turning three furrows 9x5 in. by means of a Saunderson plow, did work that was unexcelled on the heavy land, while the other had one of the heaviest patches to deal with and occasionally called for the lowest of its three gears. Both ran on kerosene with a clean exhaust and without sign of misfiring.

Two fellow American tractors which behaved well and did good work were the Wallis Juniors, burning kerosene; one, using a three-furrow 9x5 in. Ransome self-lift plow making no undue effort in a stiff field alongside a Fordson that was clearly over-loaded by a 10x5 three-furrow Oliver.

The Weeks-Simplex apparently appealed to the agriculturists present with considerable force, for it was followed by an obviously admiring crowd of dimensions as large as any, if not larger. It is a neat little machine, not so clean, perhaps, as the unit type—it has its engine and gear set mounted on a channel steel frame—but accessibility was clearly marked, and this is a feature which the discerning among users consider of much importance. Clean outline is desirable and attractive at first glance but many expressions of opinion were overheard giving the view that this point was being overdone in many cases, and that accessibility was being sacrificed to an extent not justified in practical use.

The Weeks tractor using kerosene handled a 10x5 in. three-furrow Ransome self-lift plow quite comfortably, although traveling rather slowly. One Whiting Bull took part in the plowing tests, burning kerosene and hauling with ease a two-furrow 10x6 in. plow.

The Austin is a British competitor of the Fordson. It has a 4-cylinder 3¾x5 engine

The Clayton Creeper has a 4¾x5½ Dorman truck engine and burns kerosene

In the oval, the Crawley self-contained tractor plow. The driver dismounts to manouver at head lands; engine then balances plow frame on axle and machine can be turned on its own axis

BELOW—*The Saunderson and a self-lift riding plow*

BRITISH TRACTOR TRIAL CORRESPONDENCE

Plowing In The Light Land

AFTER a day's work on the heavy soil the competing machines were taken to the higher ground and decidedly lighter land. This, too, was patchy. Some was almost as heavy as the lightest plowed on the first day, while at the other extreme was an almost sandy loam.

It would be sheer repetition to deal with individual performances on the second day and the first half of the third day, for the machines did uniformly successful work. Only in a few cases were plows fitted dealing with an extra furrow; in most instances the same plow was used as on the heavy land, although it was usually set slightly deeper. This lighter soil was very shallow and in a number of places the plows touched rock when set to operate even only 5 in. deep. The tenant farmers whose land was treated would not allow—and their word was law in this respect—furrows wider than 10 in. So the tractors worked under far easier conditions than in the heavy land, and overheating was the only trouble observable. The day was decidedly warm, the temperature being 15 to 20 deg. higher than on Wednesday, and, although a breeze was blowing, a few radiators were seen steaming merrily.

The unique Pick had obtained new gears and was at work but clearly it is not yet fully developed. It boiled its cooling water and several times set fire to woodwork that was too near its exhaust pipes.

As on the first day, kerosene was used with success on practically all the machines burning that fuel, this despite the fact that, on account of the lighter work, conditions were not as favorable to the maintenance of so high a temperature of the vaporizers as on the heavy land, where the engines were generally pulling really hard all the while.

On the third morning of the trials, while the plowing was being finished, a heavy rainstorm passed over the grounds, lasting nearly an hour. As a result some of the land was rendered unfit for immediate harrowing, and this spoiled the opportunity for making comparisons. Some of the tractors cultivated the ground they had plowed and with disk or tine harrow then worked on stubble. Others harrowed stubble only and a few were kept on plowing. It is difficult to see, therefore, how the judges will proceed in this matter, and it is possible that the only useful purpose served by the Friday afternoon's operations was to demonstrate to the farmers present the ability of tractors generally to undertake various classes of work.

Hauling Tests

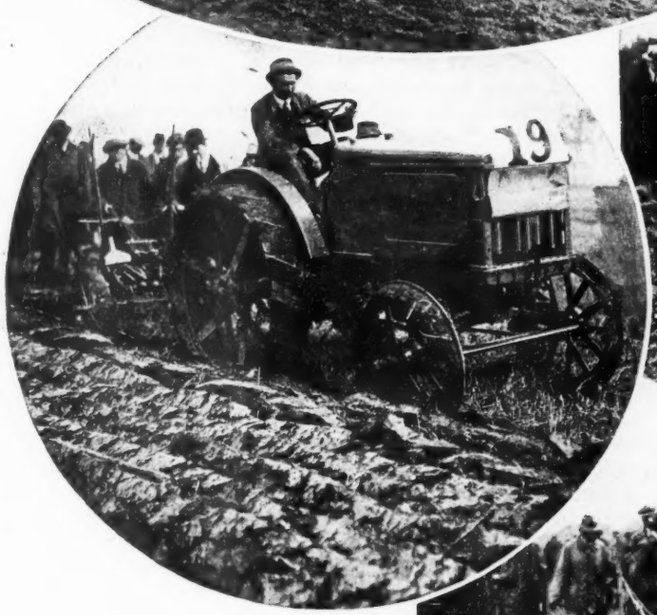
Hauling tests were carried out at intervals on all three days of the trials. A hill running up the side of the "cliff" separating the low ground, where the first day's plowing took place, from the scenes of the second and third day's operations, formed an ideal location for the purpose. Without being exceptionally severe, the gradients were quite stiff enough to provide a good test of hauling abilities. From the foot of the hill the road sloped gradually

Tractors at the British Trials

Name of Tractor	No. of Wheels	Type Wheel or Chain Track	Number of Cylinders Vertical or Horizontal	Bore and Stroke	Normal r. p. m.	Number of Plows Heavy Land	Number of Plows Light Land	Width of Furrow Heavy Land	Width of Furrow Light Land	Depth of Furrow Heavy Land	Depth of Furrow Light Land	Fuel
Alldays & Onions	4	Wheel	4 Vertical	4⅛x 6½	900	4	4	10	10	6	6	Kerosene
Avery	..	Wheel	4 Horizon.	4⅝x 7	700	3	4	9½	9	5	6	Kerosene
Austin	4	Wheel	4 Vertical	3¾x 5	1,200	3	3	9	9	6	6	Kerosene
Austin	4	Wheel	4 Vertical	3¾x 5	1,200	3	3	9	9	6	6	Kerosene
Blackstone	..	Ch. Track	3 Vertical	5 x 6½	750	3	3	9	9	5	6	Kerosene
Clayton	..	Ch. Track	4 Vertical	4⅝x 5½	1,000	4	4	9	9	5½	5½	Kerosene
Cleveland	..	Ch. Track	4 Vertical	3¾x 5½	1,200	2	3	10	9	5	6	Kerosene
Cleveland	..	Ch. Track	4 Vertical	3¾x 5½	1,200	2	3	10	9	5	6	Kerosene
Crawley	2	Wheel	4 Vertical	4⅛x 5½	1,000	3	3	9	9	6	6	Gasoline
Emerson	4	Wheel	4 Vertical	4¾x 5	900	3	3	10	10	6	6	Kerosene
Eros (Ford Attachment)	4	Wheel	4 Vertical	3¾x 4	1,000	2	2	10	10	6	6	Gasoline
Fiat	4	Wheel	4 Vertical	4 x 7	900	3	3	10	10	5	5½	Kerosene
Fordson	4	Wheel	4 Vertical	4 x 5	1,000	3	3	10	10	5	5	Kerosene
Fordson	4	Wheel	4 Vertical	4 x 5	1,000	3	3	10	10	5	5	Kerosene
Garner	4	Wheel	4 Vertical	4¼x 5½	1,200	3	3	9	9	5	5	Kerosene
General Ordnance	4	Wheel	4 Vertical	4½x 5¾	1,000	3	3	10	10	5½	5½	Kerosene
Glasgow	3	Wheel	4 Vertical	4¼x 5½	1,100	3	3	10	10	5	5	Gasoline
Gray	4	Wheel	4 Vertical	4¾x 6¾	850	4	4	10	10	6	6	Kerosene
International, Junior	4	Wheel	4 Vertical	4 x 5	1,000	2	3	9	10	6	5	Kerosene
Mann (Steam)	4	Wheel	2 Horizon.	4&6¾x8	300	4	4	9	10	5	6	Coal
Martin	..	Ch. Track	4 Vertical	4½x 5½	1,000	3	3	9	9	5	5	Kerosene
Martin	4	Wheel	4 Vertical	4½x 5½	1,000	3	3	10	10	6	6	Kerosene
Maskell	2	Wheel	4 Vertical	4 x 5	1,200	2	2	9	9	6	6	Kerosene
Mogul	4	Wheel	2 Hor. Oppd.	8 x12	550	4	4	9	9	6	6	Kerosene
Moline	2	Wheel	4 Vertical	3½x 5	1,200	3	3	10	10	5	5	Gasoline
Moline	2	Wheel	4 Vertical	3½x 5	1,200	..	3	..	10	..	6	Kerosene
Moseley (Illinois)	4	Wheel	4 Vertical	5 x 6½	800	3	3	10	10	6	6	Kerosene
Omnitractor	4	Wheel	2 Vertical	6½x 9	750	3	3	10	10	6	6	Kerosene
Overtime	4	Wheel	2 Horizon.	6½x 7	700	4	4	10	10	6	6	Kerosene
Pick	3	Wheel	4 Vertical	4⅜x 5	800	..	3	..	10	..	5	Gasoline
Saunderson	4	Wheel	2 Vertical	5½x 8	750	3	3	9	10	5	5½	Kerosene
Saunderson	4	Wheel	2 Vertical	5½x 8	750	3	4	10	10	5	5	Kerosene
Titan	4	Wheel	2 Horizon.	6½x 8	800	3	3	10	10	5	6	Kerosene
Titan	4	Wheel	2 Horizon.	6¼x 8	800	3	3	10	10	5	6	Kerosene
Wallis Junior	3	Wheel	4 Vertical	4¼x 5¾	900	3	3	9	9	5	6	Kerosene
Wallis Junior	3	Wheel	4 Vertical	4¼x 5¾	900	3	3	9	9	6	6	Kerosene
Weeks Simplex	4	Wheel	4 Vertical	4¼x 5¾	900	3	3	10	10	5	5	Kerosene
Whiting Bull	3	Wheel	2 Hor. Oppd.	5½x 7	750	2	2	10	10	6	6	Kerosene

Above—Mogul tractor and 4-furrow Ransome riding plow working in heavy land

At left—International working in better soil



Above—The Fiat, Italy's representative, made light work of heavy land

Above, at right — The Saunderson, worked with two wheels in the furrow

The Blackstone was followed by a crowd

up about 200 yards, after which the gradients increased in severity, averaging 10 per cent on the steepest portions of the rise. The total length of the hill was nearly half a mile. The surface was a fair example of what is found on the by-roads of England, having a granite surface, with a few loose stones in several places, not affording a good grip for metal shod wheels.

Each tractor was called upon to draw a trailer up this hill. The wagon weighed 30 cwt. (3,360 lbs.) unladen and carried a load of 4½ tons (10,080 lbs.) or thereabouts of pig-iron—a load, however, which had to be considerably reduced in some cases before the tractors could reach the top of the hill while in other cases the weight dealt with exceeded 4½ tons.

In the instances where failure occurred in this test, wheel adhesion was chiefly at fault, not the power of the engine or the gear ratios. Rubber blocks or tires attached to the driving wheels overcame the trouble, and several machines so equipped—the International Junior was one—made very creditable performances. The tractor named, fitted with rectangular blocks on the driving wheels, hauled over 10,000 lbs. to the top of the hill without a sign of wheel slip and with apparent ease. An Austin, similarly shod, an Alldays with circular rubber pads on all wheels, and a Garner on plain rubber tires clipped in three sections to the driving wheel rims were equally successful with over 10,000 lbs. in the trailer. In all cases the weights refer to "useful" load carried, in addition to the weight of the trailer.

Several tractors showed their capabilities as stationary engines by being employed in threshing out corn at neighboring farms, but there is need for little to be said of these operations, beyond that no difficulty was experienced in working the 4 ft. 6 in. threshing machines.

Management

It is difficult for the mere spectator, as distinct from officials, to say how the organization of the trials could be improved upon in matters that really count. Perhaps the contact during each day between the farmer-observers of the machines and the judges and stewards was not as complete and constant as it might have been. Each morning before work commenced a meeting of stewards and observers took place, and instructions to each of the latter were then issued. But some of them did not put in an appearance at the meetings, and others did not grasp the full intent or detail of their instructions.

These observers were practically all volunteers from the farms in the surrounding district. They were given quite a nominal remuneration for each day's attendance and some of them, perhaps, had not quite keen enough wits to render their services as efficient as might be desired. But they all knew good work from any that was bad or indifferent; they were mostly suspicious of their charges and this made them all the more ready to note unusual happenings or involuntary stops.

The meeting was well advertised, far and near, and farmers from parts even as distant as Scotland were among the visitors. One party of four that the writer interrogated had driven some 300 miles to attend the trials.

Farmers and other interested spectators, as well as members of the press, would have liked to have had daily reports concerning acreage, fuel consumption, plows used and depth and width of furrows. But the management bowed to the decision of the judges that none of the material available to them should be issued until their report may be published. This matter may, perhaps, represent a choice of two evils. On the one hand a good report concerning one day's work of a particular machine may clinch orders on the spot that would otherwise be postponed indefinitely. On the other hand, a seemingly indifferent report may have unspecified and extenuating circumstances or conditions and the machine involved may, with great injustice, be passed over and preference given then and there to one that, were all the factors known, would have showed up unfavorably by comparison.

It must be admitted that, if daily reports were sufficient to enable a true opinion to be formed by those to whom such reports were available, there would be no need for judges—the farmer would be able to judge for himself. But so many factors enter into the matter from the farmer's point of view that it is not surprising that the judges were averse to issuing any official results until after the end of the trials.

The courtesy extended by the officials to inquirers innumerable was marked. Organizer H. Scott Hall and Press Manager C. D. Clayton left nothing undone to assist the press and to the former is due, in a great measure, credit for the success of the trials. The Technical Adviser, G. W. Watson, was indefatigable and uniformly courteous, ready to explain his aims and methods to the most inexperienced inquirer.

It is intended, or at all events proposed, that the trials shall be an annual event, but on a much larger scale so far as the exhibition is concerned. Next year, perhaps, tractors, implements, accessories, light and heavy trucks, and even (it is whispered) many private cars probably will be on view.

How Tests Were Conducted

THE organizers of the trials, the British Society of Motor Manufacturers and Traders, gained in advance the cordial and close co-operation of the leading agriculturists' body in Great Britain, the National Farmers' Union, and the latter accepted the responsibility of appointing practical men as judges, who numbered six and were all members of the council of the Union. Their impartiality, and their ability to recognize good work and meritorious operation, were undeniable. They made personal inspection of each machine and its work, and were assisted by a staff of stewards and observers. Each steward was in charge of a given number of tractors and a farmer-observer was especially told off to watch each machine, never leaving it, checking and recording its fuel consumption and making note of the duration and cause of every stop, whether the halt occurred for the driver's convenience or for adjustment to tractor or plow.

The stewards supervised the observers in checking the quality of the work done, not so much in view of the awards, but to prevent the land from being spoiled for cultivation. Any tractor and plow doing bad work was quickly "called off," and either its attendants were compelled to make adjustments to remedy matters or it was stopped working. Two or three such cases occurred; the Alldays and one of the Clevelands were stopped because of badly adjusted plows—the first was retired for the day on the heavy land, although the Cleveland plow was remedied.

By thus preventing the continuation of bad plowing, the organizers were helping to further the interests of tractors generally, for, as mentioned already, farmers—British farmers, at all events—still persist in blaming the tractor for bad results, although the plow may be wholly and solely at fault.

The observers and stewards also checked the acreage of work done, and the time occupied, the former by direct measurement of the ground plowed, for, although some

(*Continued on page* 813)

France Has Potential Production of 200,000 Cars a Year

American manufacturers should read Mr. Bradley's article herewith to visualize the competition that may be expected from the French companies when they reach full-swing output. France, and Italy as well, in Mr. Bradley's belief, will make many more cars than before the war, thus becoming stronger factors in the field of international sales

By W. F. Bradley

FRENCH manufacturers produced 50,000 cars in 1913, of which 25,000 were exported. The productive capacity of the automobile factories in 1920 will be not less than 200,000 cars.

That is a moderate estimate, for Citroen, Renault and Berliet each have a productive capacity of 100 per day, or 35,000 cars per year, making a total for these three of 105,000 cars. Ten more factories have a capacity of 20 cars per day, making 70,000 among them and giving a total of 175,000 cars. As there are approximately 100 automobile manufacturers in France, this leaves 25,000 cars among 87 manufacturers, or only 288 each per year.

It is practically certain, however, that the French automobile manufacturers will not devote the whole of their productive ability to the construction of automobiles. There is a general feeling that an outlet must be found in other branches of industry and most factories are preparing for this.

At present, production is very backward. Not a single firm has reached the program mapped out at the armistice and it will be six months more before many of them are in production. The difficulties are not always in the automobile factories. Outside firms, on which the factories are dependent, cannot supply. In the opinion of many, the eight-hour day has been disastrous. Transportation is still disorganized and is responsible, in a large measure, for delays in production.

Another difficulty, in the Paris region, which has 80 per cent of the French automobile factories, is the shortage of electric current. The company supplying the current is unable to meet requirements, either owing to lack of coal or because of its inferior quality, or both. As a consequence, the company has suggested that the factories should spread their working day over a number of hours greater than eight. The experiment was tried of having one-half the factories begin work at 7 a. m. and finish at 3:30 (this included half an hour's break for a meal), and the other half begin at 11 a. m. and finish at 7:30 p. m. Each fortnight, the men changed over from morning to afternoon work.

The experiment was not a success, the men saying that it upset all their domestic life. If they were on the morning shift, they could not get a meal at midday and if they were on the afternoon shift they hung about and wasted the whole morning.

In most cases, the men have gone back to the old conditions, with the result that the factories are shut down from time to time for half a day owing to lack of electricity. The company supplying the current states that the calorific value of the coal is 25 per cent less than in pre-war times and that the demand for current has increased. One of the companies states that it jumped from an average of 50,000 kilowatts during the winter of 1913 to 78,000 kilowatts in January and February, 1919.

It is certain that the French automobile factories will not attempt to work on automobiles to the full extent of their capacity. Either they are voluntarily limiting their output or they are undertaking other classes of work in addition to automobiles.

Renault's factory, the largest in France, employed 20,000 to 25,000 workers during the war and is completely in production on agricultural tractors and trucks. The factory is producing 10 tractors daily and recently has reduced the price to 18,000 francs, or $3,600 at nominal rate of exchange. No post war touring cars have been produced, the few machines put on the market being pre-war types.

Renault's intention is to specialize on a light four-passenger car of 12 hp. nominal. This was originally announced at 8,800 francs ($1,760) complete, but the price has been increased 50 per cent. In addition to automobile work, Renault is making machine tools, shafting and general factory equipment and is producing electric lighting sets, in which many of his aviation engine parts are used.

Citroen has not reached one-third the output promised six months ago, various causes having held back production. In addition to his car, the price of which has been increased 25 per cent, he is producing an agricultural tractor specially for work in vineyards and also will build sewing machines.

Darracq will produce automobiles only. The firm has a program of 20 cars a day. Two models are to be produced, an eight cylinder and a four, the two having the same bore and stroke, with many of the engine parts in common. At present, the firm is in production at the rate of six cars a day on a slightly modified pre-war type of car. The new eight has been completed and thoroughly tested but deliveries will not be ready for at least another month. The firm has acquired a controlling interest in the Clement-Talbot Co. and thus has an English factory as well as works in France.

Delage also remains on cars only and will specialize on a single model, a high class six with front wheel brakes. His output at the present time is three a day but

he is being held back by reason of delays in delivery of such accessories as electric light equipment, radiators, etc. Delage has abandoned the light, medium-priced class in order to produce a machine of the highest quality.

This car was built during the war for the French Government and deliveries are still being made to the army. Having built the car before peace was signed, it enabled the factory to get ahead but, owing to the army maintaining its contracts, deliveries to private clients have been delayed. Delage is paying attention to export business and already has on hand orders for 75 of his new chassis to be delivered to New York.

No car deliveries have been made from the Clement-Bayard factory. This firm is still working on shells and aviation engines, these being the end of old war contracts. The automobile program provides for two models, one of which is a two or three-seater selling complete at $2,000 and the other a medium-priced full touring model.

Lorraine Dietrich Plans

During the war, Lorraine Dietrich was one of the largest and most successful producers of aviation engines, the factory near Paris being turned over exclusively to this work and employing 3,000 hands. The staff is not more than 500 at present and these are not all on automobile work. Since the armistice, it has been necessary to design and prepare for production entirely new models and these will only just be ready for the show. In consequence, extensive production cannot be expected until 1920. The Lorraine Dietrich factory will specialize on a six-cylinder car.

Hispano-Suiza is preparing to get into production on the highest possible type of car. The new model is a six cylinder on aviation lines and is built almost regardless of cost. It is quite possible that there will be a smaller model but it does not seem to be known whether it will be a smaller six or a four of the same size as in the car already built. While specializing on this six cylinder car, Hispano-Suiza will keep in touch with the aviation movement and will produce aviation engines for the military and for civilian companies.

De Dion Bouton has prepared for work on three models of touring cars, several types of trucks, two types of agricultural tractors and bicycles on a big scale. The firm also has a magneto factory and is building not only for its own cars but for other companies.

Since the armistice, Berliet has been busy on trucks, of which he was one of the biggest suppliers to the army during the war. His factory at Lyons, one of the most modern in France, has been supplemented by a new factory where 5,000 workers are employed. The forge shops in this factory were in full operation last March but since then a fire has partially destroyed the building and has held back production.

Berliet's program comprises a medium priced car to be built in big quantities on American lines, the new factory being devoted to this work. The first model came out early in the present year but extensive production has not been attained. During the war, Berliet produced 20 trucks a day, in addition to shells and tanks. By means of a spirit of emulation and competitions between different departments, the output was considerably increased. A minimum production was forecasted each month and important premiums offered to the departments exceeding that amount. After the signing of the armistice, the factory went ahead on trucks, but was unable to keep pace with the demand. The touring car program was not so well developed, for few machines of this type were produced during the war, with the result that the works are not ready for mass production. The factories in the Lyons district have all the electric current required.

The Gnome & Rhone factory, one of the largest of its kind in France, is retaining its connection with the aviation engine but is preparing for all classes of engineering work. Having interests in the Rolland-Pilain automobile company, it is helping that firm to get out cars. It will market a high-class car under its own name. The works are also producing an English-designed motorcycle for a French company. They are building an agricultural tractor for an outside company and also are preparing to take up Diesel engines and other engineering work.

Bellanger, a firm which built a small number of cars before the war but now possesses a huge factory, is remaining in the automobile field with a high-class car, but intends later to enter the cheap car line in combination with Benjamin Briscoe. This car, however, has not made its appearance. In addition to automobile work, the Bellanger factory will build Diesel engines and produce drawn tubes, bicycle hubs, etc.

Ballot, who was an engine specialist before the war and built aviation engines almost exclusively during the war, is continuing in this line but has added Diesel engines to his production.

Unic Moves Slowly

Unic is moving cautiously, output being limited to 2,500 cars per year. More could be sold immediately but there appears to be a feeling that the saturation point would be reached before long and firms with over-developed factories might find themselves in difficulties. Although producing shells and aviation engine parts during the war, Unic never completely abandoned cars, with the result that the company already is in production and shipping abroad. The program of the company comprises one engine only, which is used in three different types of passenger cars—normal chassis, closed body and colonial—and also in two light trucks of one ton and 1½ ton capacity. The truck engines naturally run at a slower speed and are governor controlled but all essential parts are the same.

Among the French firms entering the automobile field are Voisin and the Farman Brothers, both of aviation fame. Voisin has brought out a high class car with the Knight engine, which, however, is not a Knight license, for these patents are void in France. The production is at the rate of about six or seven a week. The Farman Brothers, who were interested in the automobile business before they took up flying, are building a high-class six cylinder car. The first will be shown at the Paris Salon and deliveries will be made next year. This is only looked upon as an accessory, the main interest of the Farman Brothers remaining in aviation.

Unlike many of the French firms, Fiat has decided to keep its factory, which is the biggest in Europe, engaged exclusively on automobile work. With the exception of machine guns, Fiat built nothing but automobile or aviation material during the war. The output during hostilities was 56,069 trucks and touring cars, of which 50,403 were trucks. In addition, Fiat built 12,357 aviation engines with an aggregate horsepower of 3,600,000 and a large number of aeroplanes. During hostilities, 50,000 workers were employed.

The Italian Makers

Fiat has one of the best prepared programs for foreign trade to be found among any of the European factories. Since the armistice there has been delay in getting into production, owing to scarcity of material, labor troubles, transportation difficulties and generally unsettled conditions. The factory program, however, is now in an advanced condition. Fiat is specializing on three types of touring cars: a four cylinder of 65 mm. bore, a four cylin-

der of 75 mm. and a six cylinder of the same size. The smallest of these models is now in production and the other two will follow very rapidly.

In addition to touring cars, Fiat is devoting considerable attention to an agricultural tractor, which was designed during the latter portion of the war and now is being produced at the rate of ten daily. At least two types of trucks will be built: a four-ton and a 1½-ton on pneumatic tires. Fiat has adopted the policy of concentrating everything within his own factory. The firm makes all its forgings and castings, makes its radiators, produces ball bearings in its shops, builds all its electrical equipment and has steel works under its direct control. Recently the capital of the company was increased from 100,000,000 liras to 200,000,000 liras, or $40,000,000 nominal.

Recently the Ansaldo company, which is a general engineering concern quite as important as the Fiat, decided to enter the automobile line. A car was produced and tested and it looked as if there was about to be serious competition between the two most powerful companies in Italy. After reflection, however, the Ansaldo company decided to leave the automobile field alone, but latest information is that this company will put its car on the market.

Other Italian automobile factories remain in the automobile line as before the war. Lancia is specializing in high class cars and is about to put on the market a remarkable high-class 12 cylinder model. Spa will build touring cars, trucks and aviation engines. Bianchi is devoting his energies to touring cars and bicycles. Isotta-Fraschini is interested in touring cars and aviation engines. All the Italian factories have sought to make themselves as independent as possible of outside sources of supply. Thus, Lancia is completing the construction of a new factory which comprises iron, aluminum and brass foundries, forges, etc., and will have a test track within the walls.

The British Tractor Trials

(Continued from Page 810)

of the machines were provided with officially fitted acremeters, these were not considered sufficiently dependable to be relied upon as the only means to this end. To check the performances of the machines in matters of mechanical import—reliability, replacements, and so on—a technical observer was also allocated to each machine, in addition to a farmer-observer. These technical observers were provided one by each entrant and A's nominee was, for example, appointed to watch a machine made by B or C; there could be no doubt, therefore, that these men were not likely to be other than critical of the machine under their observation and would not be inclined to overlook weaknesses and defects that developed.

To obtain definite information as to the variations in the class of land in the different fields—the resistance varied greatly even in the length of individual furrows—one or more of the outfits in each field was stopped by the technical staff during its day's work and a dynamometer interposed temporarily btween tractor and plow.

Preliminary dynamometer tests of the machines took place on the Monday and Tuesday preceding the first day's plowing. For this purpose two trailers were available, loaded with pig iron. One trailer only was attached to most of the tractors but the other was available if required to increase the load on the drawbar.

The whole apparatus had been calibrated at the (British) National Physical Laboratory and had an attendant appointed by that institution. The field in which these tests were made, appeared almost flat to the eye, but the dynamometer was so sensitive that it recorded a considerable difference, owing to the slight gradient, between tests carried out in one direction and the other. The engineer in charge of these operations was W. G. Watson, M.I.M.E., M.I.A.E., the technical adviser to the judges and to the Society of Motor Manufacturers and Traders.

The judges' report had not been issued at the time of writing. It was regrettable that no official daily records were issued, but it was considered that piecemeal reports and records might be unfair to some competitors. Only comparisons from personal observation on the part of spectators could, therefore, be made during the trials, and although for this reason the latter amounted only to demonstrations for the time being, there is no doubt that the judges' report and comments will have a wide circulation among British farmers, both directly and through the press.

The report, it is promised, will take into consideration the following points:

(a) Weight of machine in full working order with spuds.
(b) Weight per square foot on front and back wheels separately in the case of a wheeled machine, or weight per square foot of track in contact with the ground for a track machine, in each case calculated on a sinkage of one inch only.
(c) Costs of fuel and lubricating oil per acre, in proportion to the draw-bar pull.
(d) Water evaporated per acre.
(e) Ease of handling, including starting time and turning at headlands.
(f) Reliability (freedom from mechanical trouble).
(g) Capital cost in relation to draw-bar pull in lbs.
(h) Mechanical construction, having special regard to simplicity and access to wearing parts.
(i) Safety of operation.
(k) Number of attendants.
(l) Capacity in acres per day of eight hours.
(m) Efficiency of adhesion.
(n) Working cost per acre.
(o) Suitability for hauling and threshing purposes.

Implements will be judged on the basis of—

(a) Construction and operation.
(b) Adaptability for different widths and depths of plowing or cultivating.
(c) Quality of work done.

AT a recent meeting of the British Association for the Advancement of Science, Capt. R. Rolleston West read a paper on airbrakes, steep landings and short runs, in which he dealt with experiments which had been made towards fitting airplanes with some form of airbrake to assist in landing on small and more or less enclosed areas. Land brakes could, of course, be used for this work, but were not very satisfactory. Airbrakes fitted to the landing chassis were tried, as also flaps both on the front and rear of the wings. The final conclusion was that steep descent and a short run on landing would best be obtained by modifying the airplane itself and not by fitting brakes of any sort.

Power Plants of the German War Trucks

This article concludes the analysis of the German war trucks by Colonel Slade. While admitting that he has not entirely covered the subject, Colonel Slade feels that he has gone as far as he should without a more thorough investigation of these trucks than he was able to make with the limited means at his command in Germany. It is our hope that much more about these trucks will soon be available through the study of the trucks now being made by the Motor Transport Corps at Washington in which are being used the facilities of the Bureau of Standards

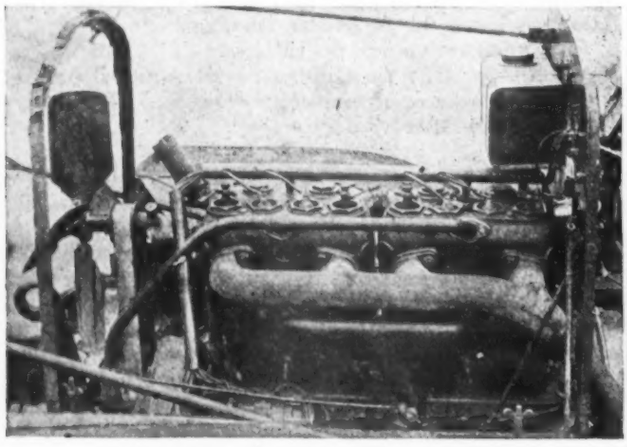
By Lieut.-Col. Arthur J. Slade

AMONG the German trucks are found examples of all the conventional types of four cylinder engines familiar in American practice, but in some of them rather unusual details of design and construction appear. If there is any general tendency in engine construction it is in the use of monobloc cylinder castings and enclosed valves in the head. With scarcely an exception, they are equipped with built-in governors of the centrifugal type; the water circulation is by pump; the tendency in radiators is toward a removable sectional core type, and the ignition is universally by magneto without any battery equipment, electric lighting or self starters. Some of the power plants—examined in more than a superficial manner during the period while the collection was being made at Coblenz—will be briefly described in this article, terminating the series which has been appearing in these pages. The results of the research now being conducted at Washington will be published subsequently.

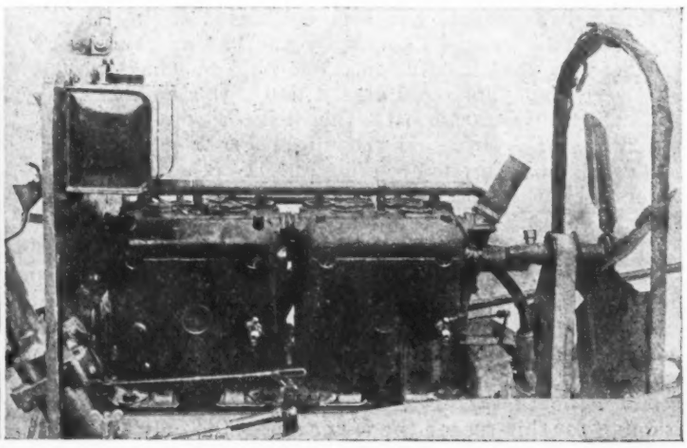
In the Adler, of which a front view photograph has appeared previously, the exposed portion of the radiator core is circular, being 20.4 in. in diameter and 4 in. in depth. The total water capacity inclusive of the engine water jacketing is 8.1 gals. The motor is mounted on a sub frame which also carries the transmission. Cylinders are L head cast in pairs with valves enclosed by cover plates. The two side views show controls and connections with the braces for the radiator guard and the single brace to the frame by which the radiator is supported. The exposed governor rod is also seen and it is interesting to note that the governor connections to the carbureters are in practically no cases enclosed to prevent readjustment or disconnection by the drivers. The truck on the dash contains the water for cooling the foot operated brake.

The pressed steel fan has four blades, 5.9 in. in width, the over all diameter being 21.25 in.

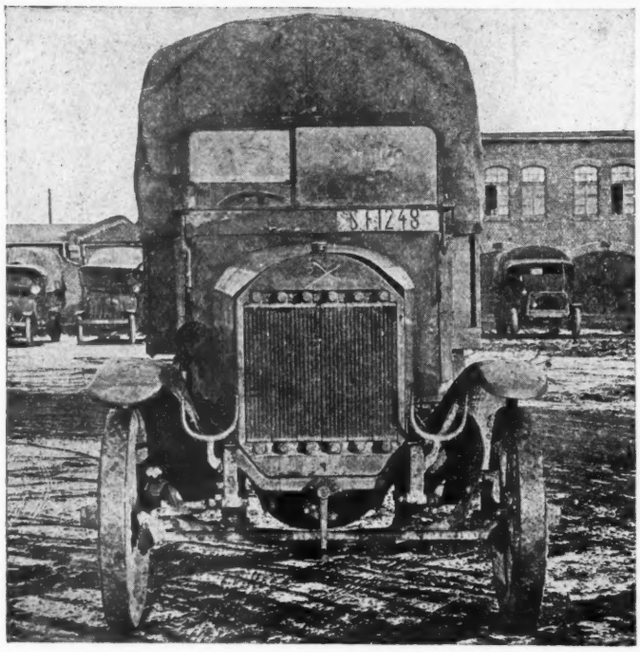
The pistons have a dome $\frac{5}{8}$ in. in height, the bore and stroke being 4.33x6.1 in., four rings above the pin being employed. The connecting rod length is 13 in. The timing gears are cut with spiral teeth enclosed in the timing gear case at the front, in which is also enclosed the governor mounted on the front of the camshaft gear,



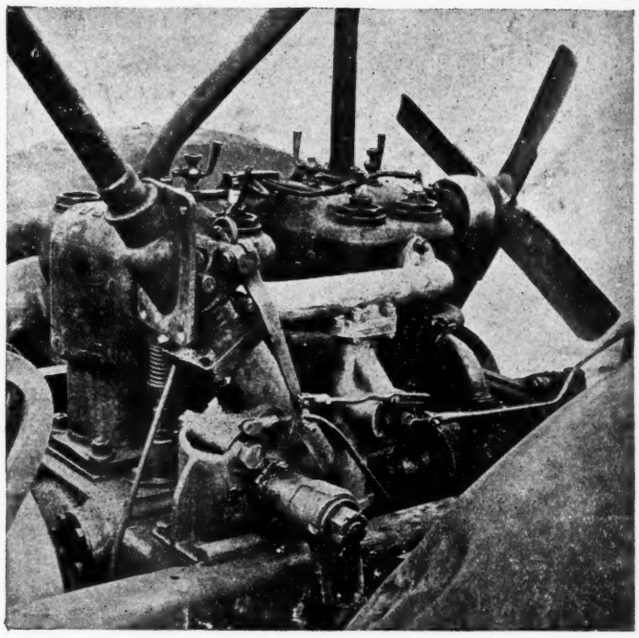
Left side of Adler engine



Right side of Adler engine

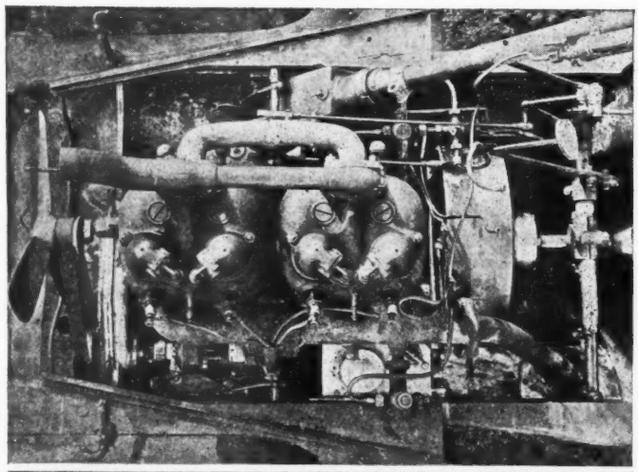


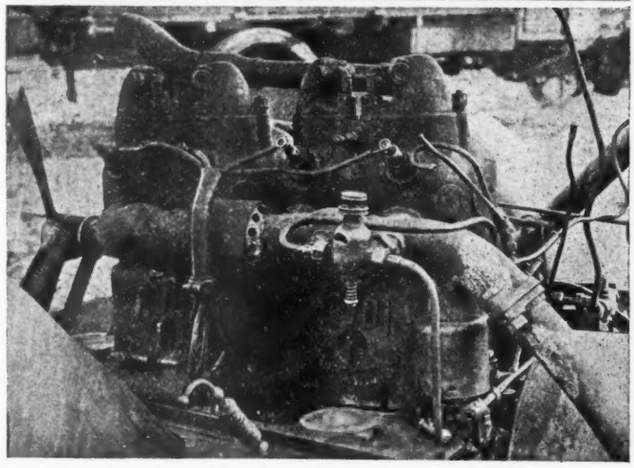
Front view of Arbenz truck



Right side of Arbenz engine

from which a control rod reaches directly back to the valve of the 1¾ in. Pallas carbureter. The Bosch magneto apparently has a fixed spark. The oil pump driver from the center of the camshaft is of the gear type and draws oil from the crankcase and forces it through the hollow crankshaft to the connecting rod and crankshaft bearings.





Top and left side of Audi engine

The Arbenz

The Arbenz has a sectional core radiator with an exposed frontal surface approximately 21 in. square and 4½ in. in depth. The sections are easily removed by withdrawing the threaded studs at top and bottom of each section and the holes may be plugged if a new core section is not available. The front view of this truck shows the appearance of the radiator construction. The total water capacity is 8.3 gals. The motor is of the T head type, with cylinders cast in pairs, and is four point suspended from the main chassis frame, the right rear support carrying the steering gear mounting.

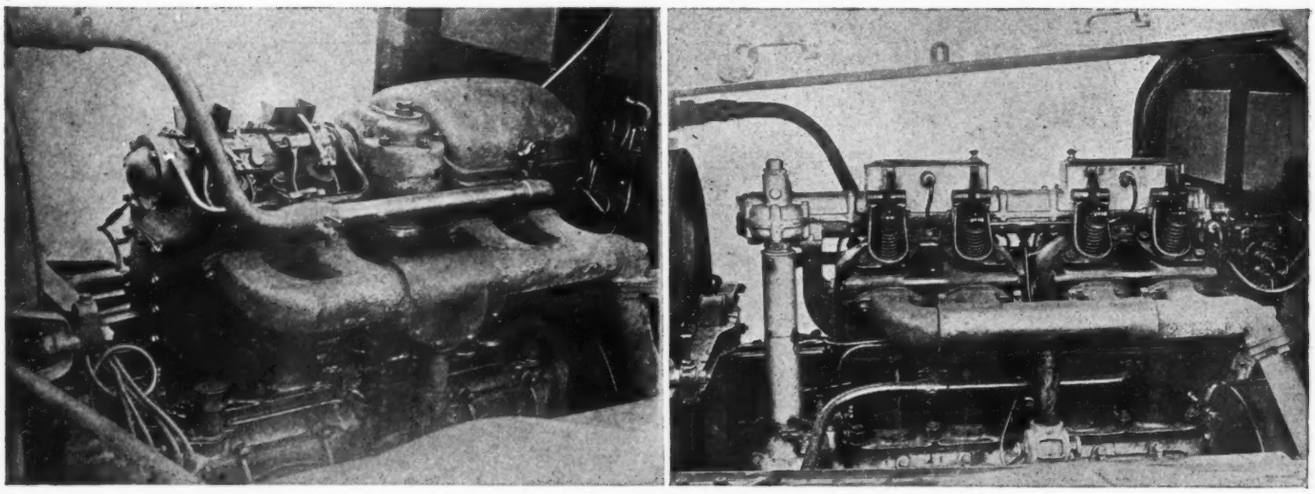
A shaft drive by the timing gears operates the governor, which is enclosed by a cover bolted to the front of the timing gear case, and its rear extension drives the water pump. A 1¾ in. Zenith carbureter and a Bosch magneto are employed. The bore and stroke are 4⅛x5⅞ in., the pistons having flat heads and four rings above the pin and a groove the width of the pin diameter. The photograph shows the right and rear of this engine.

The Audi

The Audi uses a honeycomb radiator with pressed steel shell, the total water capacity being 7.2 gals. and the exposed core surface measuring approximately 20x22 in. by four in. in depth. A three blade aluminum cast fan is belt driven from the shaft driving the magneto. The motor is four point mounted and has L head cylinders cast in pairs.

The intake valves open downward, directly above the exhaust valves, and are operated by a single camshaft from below. The top view of the motor shows the dome head mountings of the inlet valves and the cored passages in the cylinder heads for the gas intake from the opposite side.

A 1½ in. Zenith carbureter and a Bosch magneto are installed. In front of the left rear engine leg is placed a mechanical oiler driven by a vertical shaft off the rear of the camshaft, carrying at its upper end the centrifugal



Right and left sides of Bussing engine

governor, as may be seen in the photograph of the left side of the motor.

The attachment seen on the exhaust manifold is a gasoline pressure device which is also found on several other engines in the collection.

The bore and stroke are 3½x5½ in., length of connecting rod being 10¾ in. The pistons are flat headed with three rings above the pin. A fourth ring holds the wrist pin in position and prevents its rotation by passing through slots in its extremities. This truck, rated at two tons capacity, was one of the few equipped with rubber tires and, although evidently having seen hard service, it operated particularly well and was used daily by the drivers and mechanics in going to and from the village in which they were billeted.

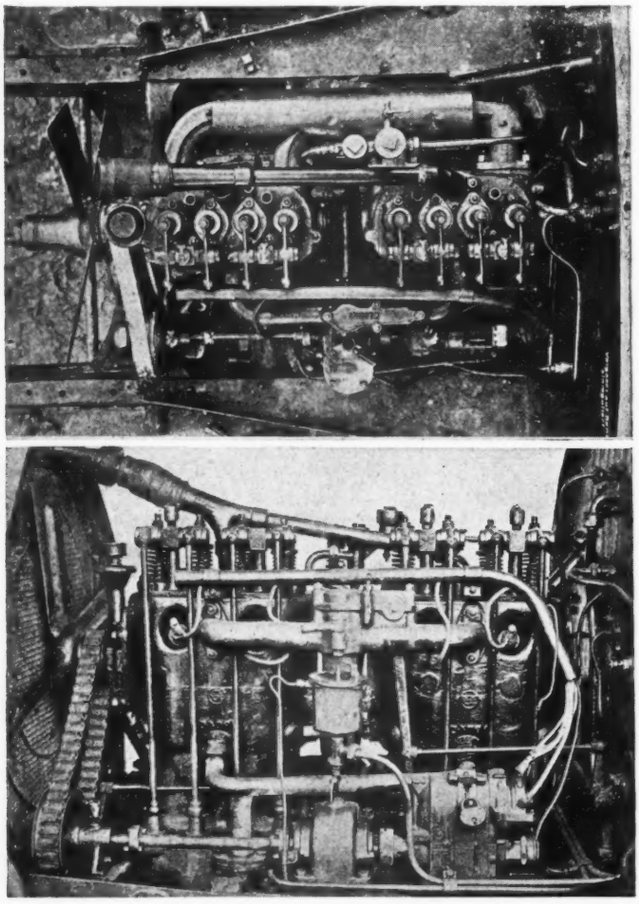
The Bussing and Daimler

Two photographs are shown of the Bussing engines. Both are of the overhead valve type operated by a camshaft driven by a vertical shaft from the crankshaft. In the case of the engine used in the 2500 kg. capacity truck, this vertical shaft is placed between the cylinder castings, while in the 4000 kg. truck the vertical shaft is placed at the front of the engine. In the first case, the valves are enclosed, as shown, while in the latter they are exposed. These engines were not disassembled and their bore and stroke are not yet known.

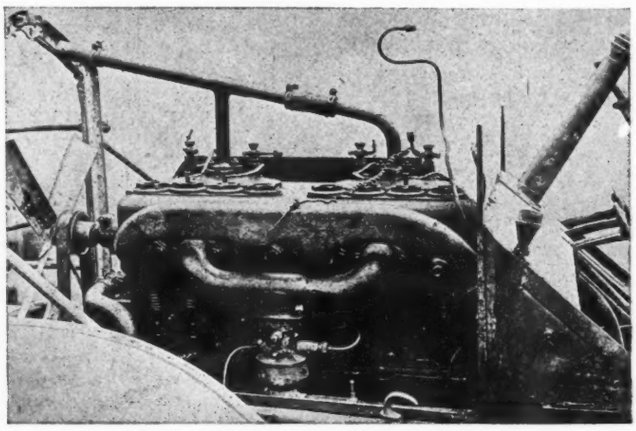
The Daimler trucks, whose engines are three point suspended, have overhead valves operated by push rods from below as may be seen by the photographs.

The Hansa-Lloyd

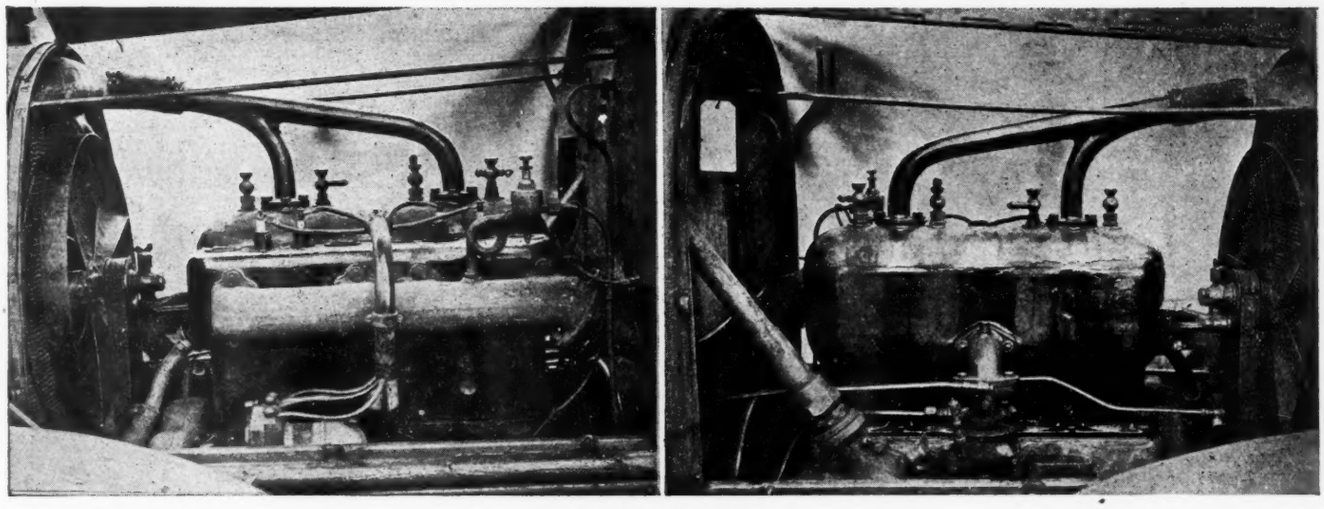
The Hansa-Lloyd has a honeycomb type core in a pressed steel radiator shell with an exposed surface approximating 22x24 in., the core being 5½ in. deep and the total water capacity 17.2 gals. A four blade steel fan 22½ in. in diameter is driven from a pulley on crankshaft. The engine mounting is at four points on a subframe and the cylinders are of the L head type cast in pairs. There is a cross shaft apparently driven by a small worm back of the camshaft gear and mounted in the main



Top view and left side of Daimler engine



Left side of Hansa-Lloyd engine



Left and right side of Durkopp engine

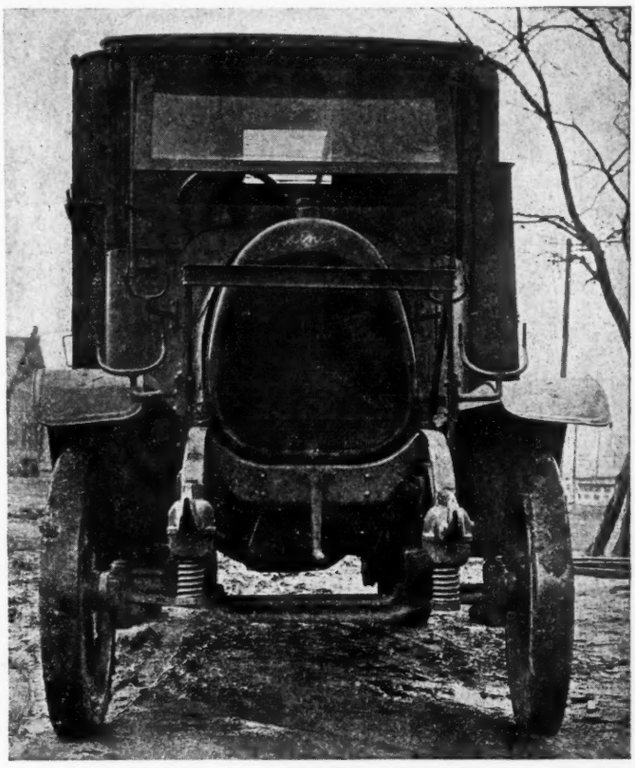
part of the crankcase. This drives the magneto and water pump, the governor being operated by the camshaft. The bore and stroke are 4 5/16x5 11/16 in., with connecting rods of 12 9/16 in. length. The pistons are domed and have five rings, four above and one below the pin. In addition, two oil grooves are cut in the pistons below the bottom ring. The left side view of the engine is shown in the photograph.

The timing gears are between the cylinder blocks. The bore and stroke are 4½x6 in., with domed pistons having three rings above the pin and connecting rods 12 in. in length. As the Daimler trucks have been produced in this country, it is not necessary to go into any further detailed description of their interesting power plants.

The Durkopp and the Horch

On the Durkopp, a fin type radiator in a pressed steel shell is employed, the height being 24½ in. and the depth 4¾ in. The front view photograph shows its peculiar outline. The cylinders are cast en bloc, of the L head type, and the suspension is four point. The intake from the 1⅝ in. Pallas carbureter is cast in the cylinder block and a hot air pipe from a point just below the exhaust manifold passes through the crankcase to the carbureter.

The oiling is by splash, a sight feed oil glass being mounted on the dash board, but the oil pump is not visible and this truck was not disassembled for closer examination, so that its bore and stroke, and any other features of its internal construction are not yet known. The two photographs of the right and left hand sides of the engine show its clean cut appearance.



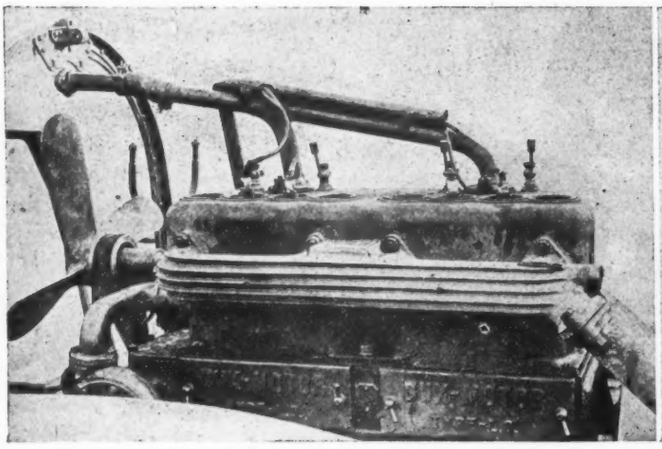
Front view of Durkopp truck

The Dux

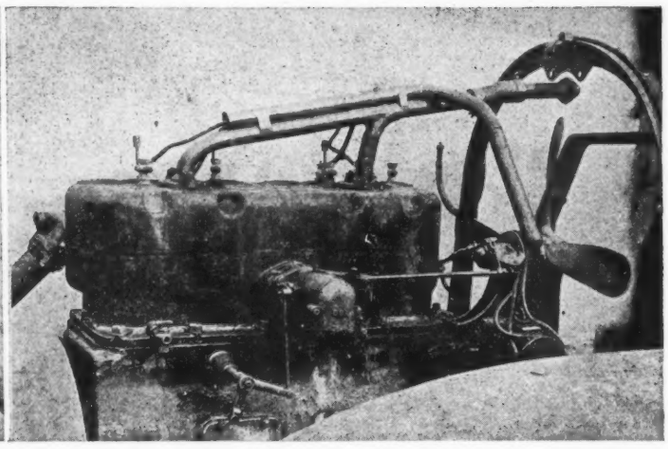
The Dux has a honeycomb type radiator core in a pressed steel shell secured to a channel iron frame which also carries the forward end of the hood. The total water capacity is 11.6 gals. A four blade cast aluminum fan is driven from a pulley on the crankshaft. The engine cylinders are cast en bloc, being of the L head type 4 5/16 x6 in., the pistons being slightly domed with four rings above the pin and the connecting rod being 14 in. in length. The cylinder walls project down into the crankcase about three inches below the cylinder block, the barrel type crankcase being correspondingly increased in height. The camshaft gear is driven by a silent chain and the gearcase cover design indicates that the forward end of camshaft is carried by a bearing in the cover, this being necessitated by the fact that the camshaft gear is located far enough forward from its bearing in the crankcase to permit of a spiral gear driven cross shaft to be placed directly in its rear. This cross shaft drives the governor and water pump at one end and the magneto at the other. The oil system is by pressure driven by a gear pump off the camshaft between the third and fourth cylinders.

The carbureter is bolted to the right side of the cylinder block and a hot air passage from the exhaust manifold is cored in the casting. The intake passages from the carbureter are also cast in the cylinder block. The engine is quiet and on road test developed ample power, while its simple and compact appearance will be noted in the photographs.

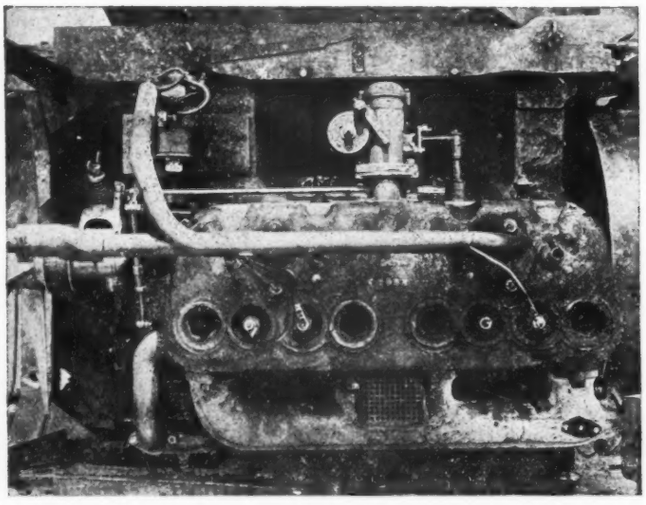
The Horch shaft drive truck is probably a recent model, as is indicated by some of its features of construction touched on in previous articles. Its radiator is of the honeycomb type with core 22¼ in. square and 5 11/16 in. deep, the total water capacity being 11.3 gals. The four



Left side of Dux engine



Right side of Dux engine



Top view of Dux engine

bladed fan is driven by an enclosed chain. The cylinders are in a single block casting of the L head type and the mounting is at four points to the main frame.

The 1½ in. Zenith carbureter is bolted to the block with hot air intake and inlet passages cored in the casting. An external mechanical oiler is employed, probably providing force feed lubrication to the crankshaft bearings, while the connecting rod bearings and cylinder walls are lubricated by splash. The water pump is in front of the timing gear case, the same shaft also driving the magneto which is directly at the rear of the case. On the opposite side of the engine the centrifugal governor is enclosed in a housing forming part of the front of the case. The timing gear case is enclosed in a housing forming part of the front of the case. The timing gear case is shown in the photograph with cover removed.

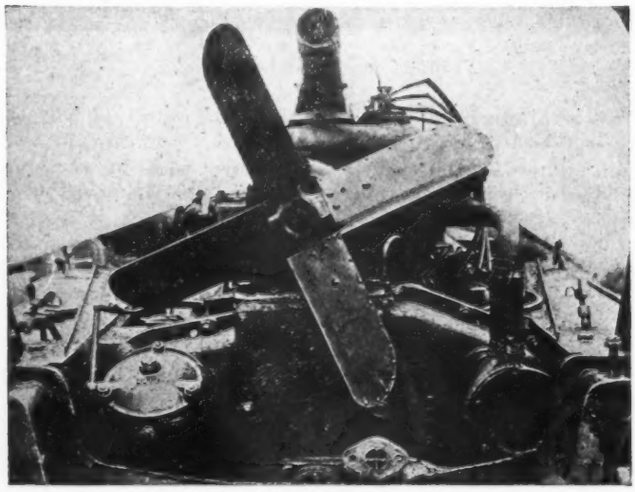
The cylinder dimensions are 4⅝x6¼ in., the connecting rod length being 11¼ in. Flat top pistons are used, having three rings above and one ring below the pin. A front view of the engine is shown, the radiator having been removed, and also right and left side views.

The Komnick

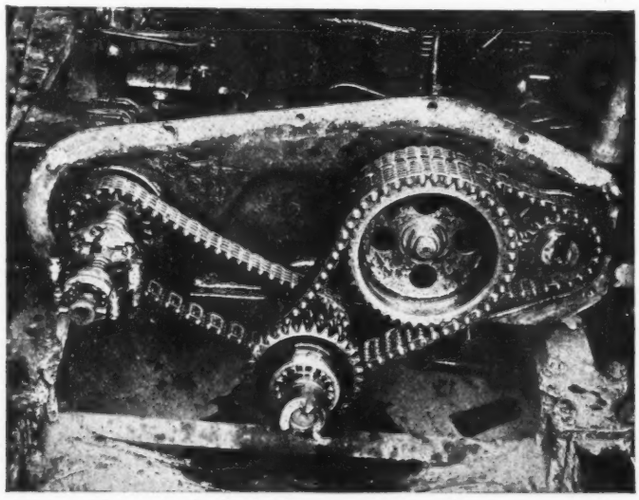
The Komnick 4000 kg. truck has an L head engine with cylinders cast in pairs in which, as may be seen by the photographs, the inlet valves are overhead, the pushway operating same passing up through the cylinder castings. The fan is gear driven and on this truck was found a compression release operating by moving the camshaft from the rear. No disassembling of the chassis was attempted but it is thought that, when it is taken down, the engine will be found to be of interest.

The Luc

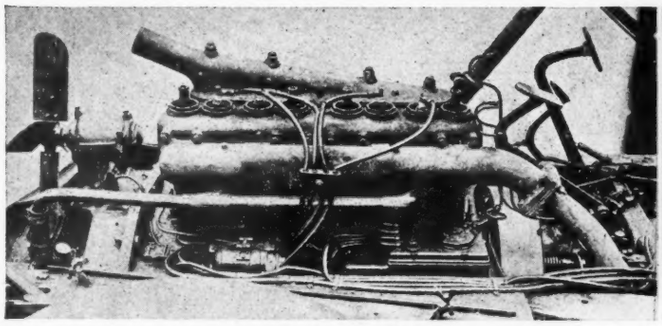
In the Luc is found another variation of the overhead intake valve arrangement in an engine which might be



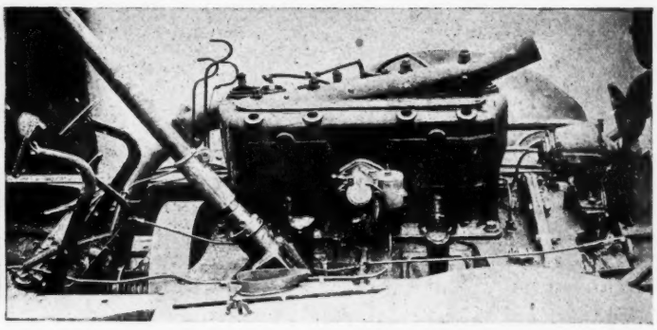
Front view of Horch engine



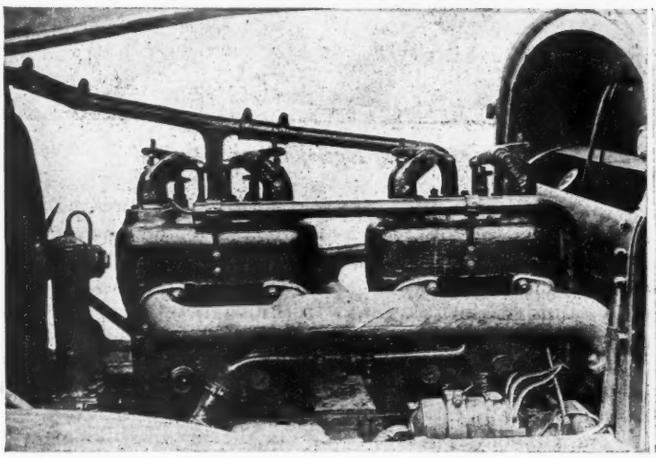
Horch timing gears



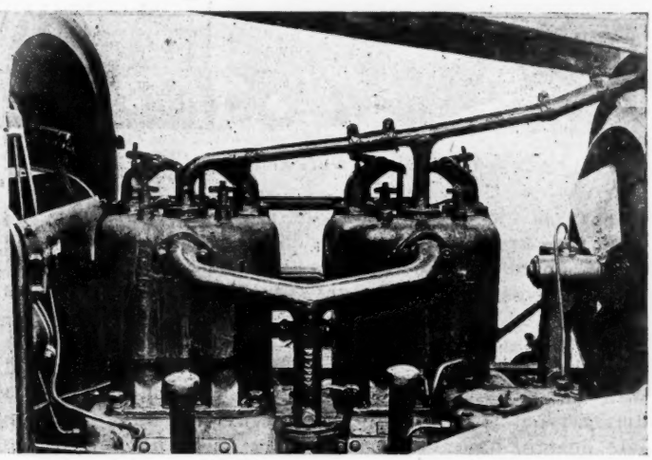
Left side of Horch engine



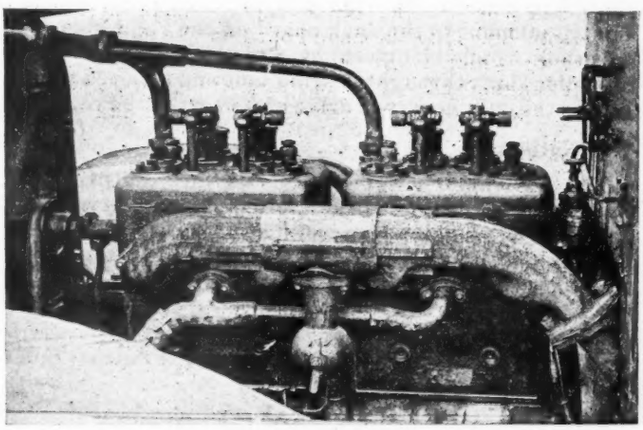
Right side of Horch engine



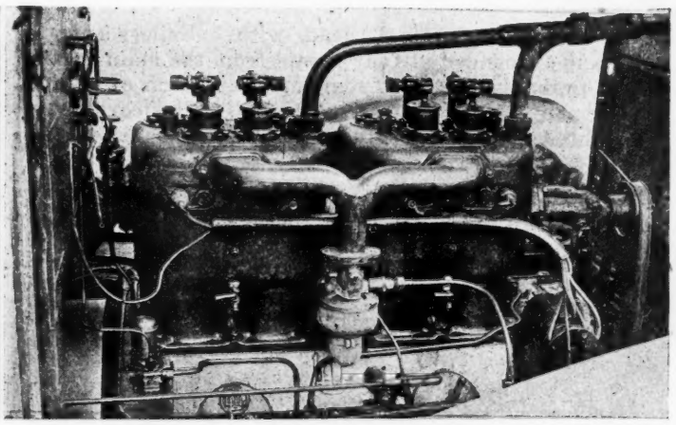
Komnick engine, left side



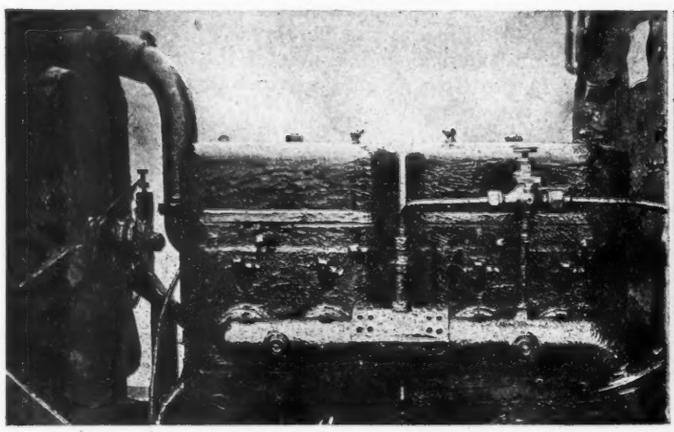
Right side of Komnick



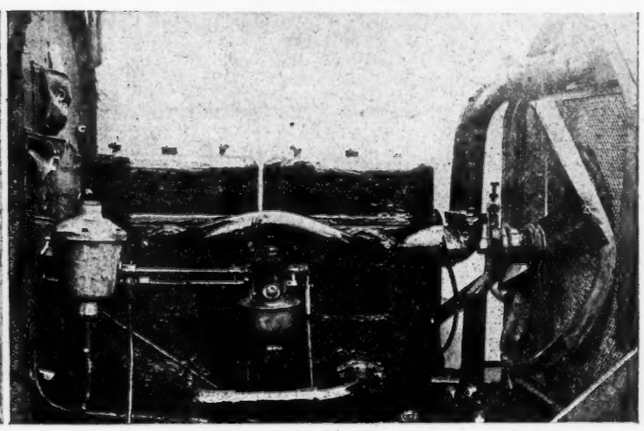
Left side of Luc engine



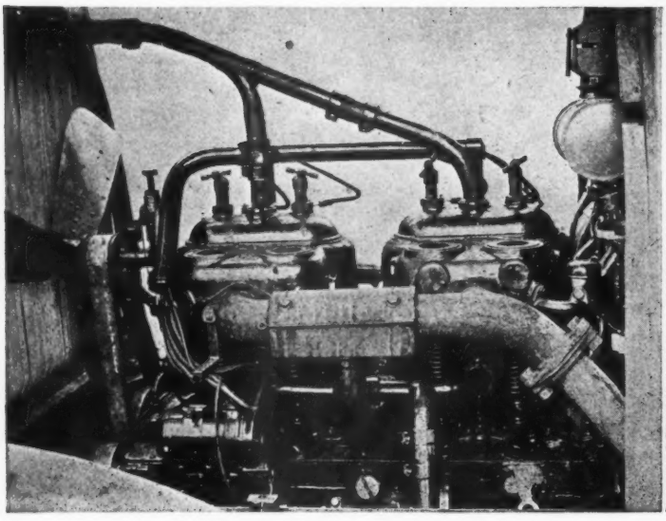
Right side of Luc engine



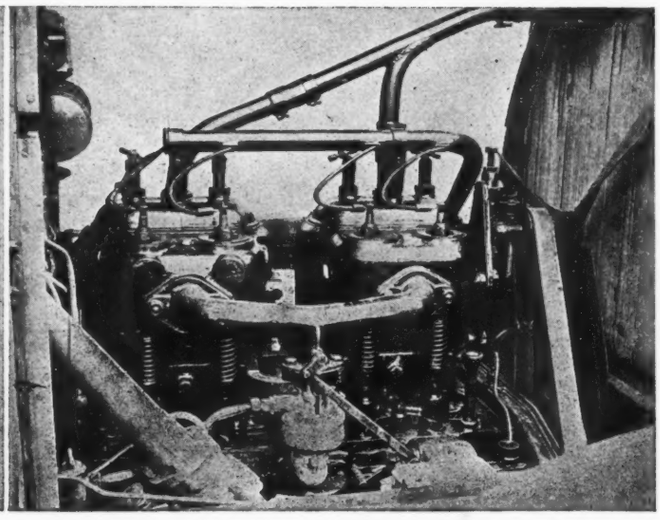
Left side of Nacke engine



Right side of Nacke engine



Left side of Nationale engine



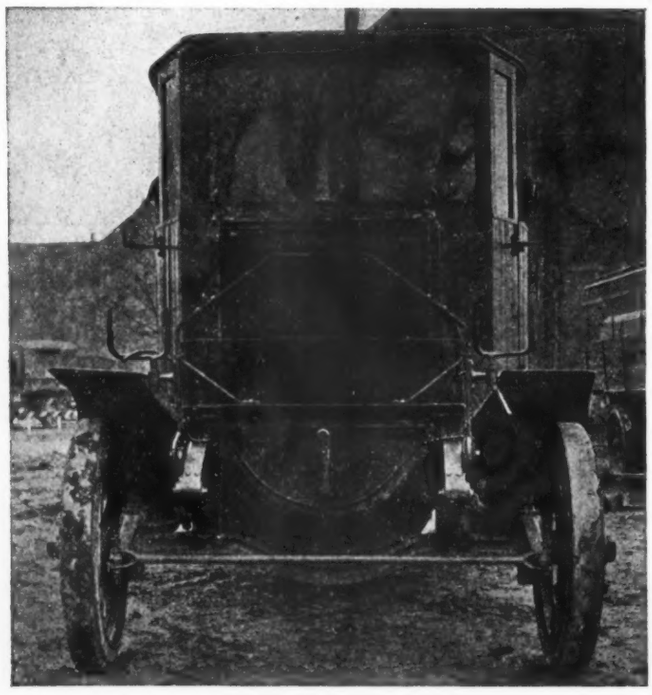
Right side of Nationale engine

classed as either an L head or a T head type. All the push rods are operated by one camshaft at the left of the motor, on which side are placed the exhaust valves. The intake valves are on the right side of the block above the pistons and are operated by rocker arms. It will be interesting to learn the details of design and construction when this engine is disassembled as the truck performed well on road test, although it is of a conventional chain driven type. The whole truck, however, seems to be of a late design, having a pressed steel cab and one of the vertical sectional radiators.

The Nacke

The Nacke engine is L head, with cylinders cast in pairs and suspended at four points from the main frame, and is probably the most completely enclosed of any in the German truck collection. A 1⅝ in. Pallas carbureter is mounted at the right side. The intake manifold evidently connects with passages running through the castings to the inlet valves which are inverted and operate above the exhaust valves, being actuated by short rocker arms connected with push rods running down through the cylinder block castings to the camshaft. The rocker arms, together with spark plugs and wiring, are entirely enclosed by the pressed steel covers secured to the tops of the cylinder blocks. The oil pump is in the back of the crank case and is driven from the camshaft.

The curious appearance of the surfaces, which will be noticed in the photographs of this engine, is due to heavy oil slushing having been applied for protection during shipment, before the photographer made the pictures. The attachment to the dash board on the right side is the governor which is driven by a flexible shaft from the propeller shaft through a spring belt and grooved pulleys. This is the only governor drive of its sort in the collection.



Front view of Nationale truck

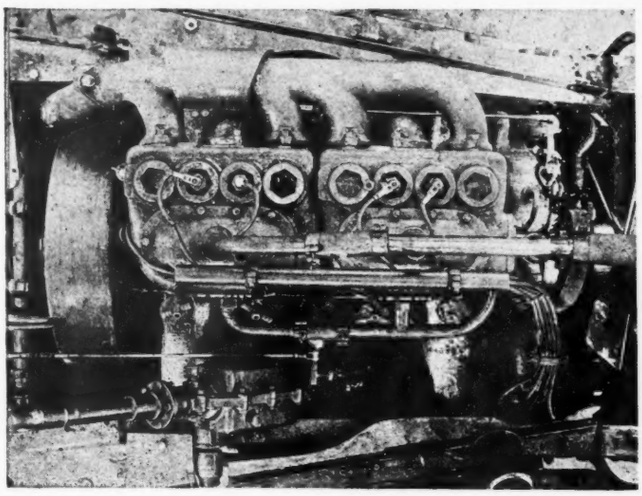
The Nationale

The Nationale power plant is of interest principally on account of the type of radiator employed—a type found only on this model. The cooling surface is composed of a group of flat pressed metal sections bolted together in a cast iron frame in which water passages are cored. If the water in the radiator freezes, the sections may bulge outward but will not burst. The construction is similar in principle to that employed in the French "Solex" radiator.

The front view of this truck shows the appearance and the core sections can also be seen in the pictures of the engine. The latter is a conventional T head type, and although it does not appear to be particularly modern in its design, this model was referred to by several German officers and men as being one of the most popular employed in the German motor transport service.

The Podeus

The Podeus showed the highest fuel economy of those subjected to road test. Its radiator is of the honeycomb type with 8½ gals. capacity inclusive of engine water jackets, the air being circulated by a four blade pressed steel fan of 15 in. diameter driven from pulley on crankshaft at 1.8 to 1. The engine is four point suspended from the main frame, with cylinders cast in pairs. The exhaust valves operate upward on the left side while the inlet valves operate downward on the right side above the pistons. A single camshaft operates both sets of valves, the valve lifters for the overhead valves passing upward



Top view of Stoewer engine

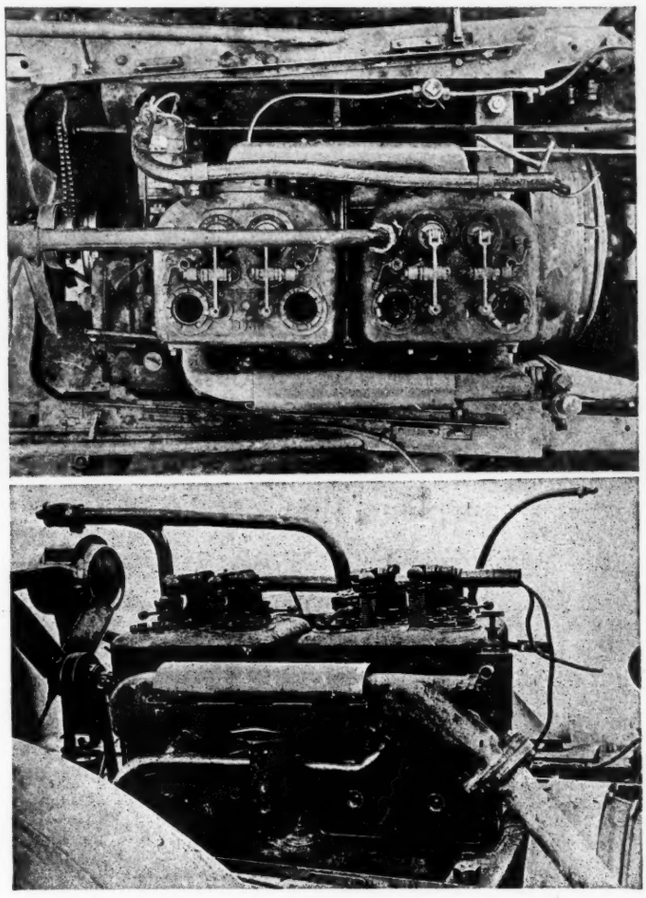
through the castings and actuating rocker arms, as may be seen in the top view photograph. The bore is 4⅜ in. and stroke 5⅞ in., with 12 in. connecting rods. Pistons are domed with three rings above the pin, an oil groove at the pin center line the width of which is equal to the pin diameter, and a narrow oil groove near the bottom of the piston skirt. A magneto mounted on the dash board supplements the regular magneto, being used only for starting, as it is driven from the starting crankshaft by sprockets and chain, thence by flexible shaft, and becomes inoperative when the engine starts and the starting crankshaft ceases to rotate.

The Presto

In the Presto two ton truck, another block motor is found of the L head type, four point suspended from a sub frame. A vertical tube core with continuous flanges is mounted in a pressed steel shell having an unusually large water tank. An Eiseman magneto with automatic advance is employed and the carbureter is a 1⅝ in. Meco. The crank and timing gearcases are of aluminum.

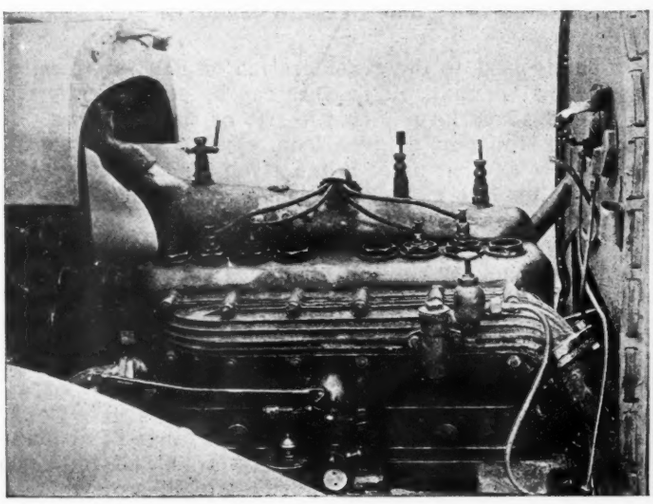
The Stoewer

The Stoewer, whose engine is of a conventional L head construction, with cylinders cast in pairs, has, according to the notes made in connection with its examination, a bore of 4 5/16 in. and a stroke of 7 7/16 in., with 12½ in. connecting rods. If this stroke has been correctly measured, it is the longest of any in the collection. The pistons are domed, have four rings above the pin, a wide relief groove cut out at the center and a small oil groove near the bottom of the skirt.

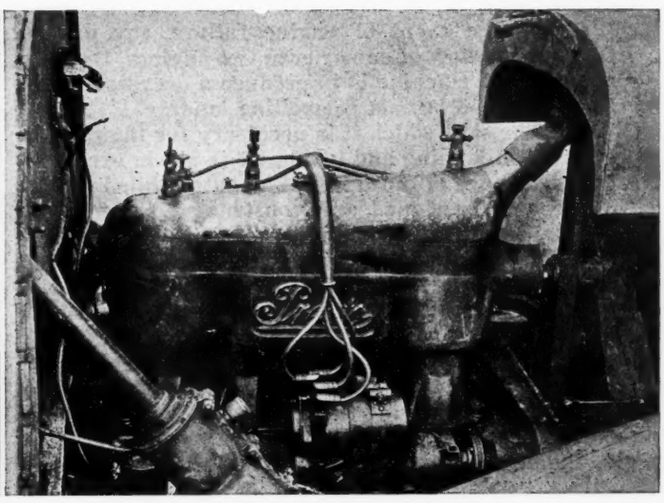


Top and left side views of Podeus engine

Whether these German trucks will have any marked influence upon the future design of American military or commercial vehicles will depend largely upon the consideration given to their individual detail features of design and construction, rather than regarding them as a collection to be compared as a whole with any similar group of American vehicles.



Left side of Presto engine



Right side of Presto engine

The Commercial Future of the Large Airplane

There are some surprising theories advanced in this article, written by a man who has made for himself an undoubted place among the British airplane builders. He has been engaged in designing large airplanes and probably knows better the possibilities in this line than any other engineer. His dream is an airplane that carries a useful load of 40,000 pounds. Mr. Barling is enjoying a vacation looking over the American aircraft industry and his ideas are given greater prominence in view of the results of the military race across the Continent.

By W. H. Barling, A.R.C.Sc., B.Sc., A.F.R.Ae.S.

THE great aerial highway has hardly as yet been used at all for commercial transport. Yet there lies the ocean of air above us, the medium through which will be carried urgent goods and those passengers who value time and safety more than cheapness of fare. The process of threading one's way through the roads and streets, whether by automobile or otherwise, must become less and less economical and more and more dangerous as time goes on.

The air above us, divisible into layers, say 1000 ft. apart, is in effect many oceans superimposed—oceans covering not only water but land. Here then is space, which compared to that available on other highways is almost unlimited and hence the chance of collision exceedingly small.

It is evident that travel on this great aerial highway must be the safest possible mode of traveling provided that:

(1) The chance of mechanical failure or breakage of the apparatus is no greater than that of the failure of bridges.

(2) In the event of engine failure, say due to faulty magnetos, of one or even two engines, the only effect on the machine is to produce a decrease of its forward speed but not compelling landing.

(3) The skill which it is necessary for the pilot to exercise in landing and taking off is not in excess of that demanded of the driver of an automobile in town.

The airplanes designed and constructed for fighting or bombing do not satisfy all of these conditions; in fact, the majority do not satisfy any of the three conditions. It would have been a mere coincidence if they had, as the war plane was designed with the following fundamental idea in mind:

The occupant may be killed either by bullets or by breakage of the machine itself. If the machine were made stronger, then, owing to the extra weight, its climbing and manouvering capabilities would be so reduced as to give the pilot a poor chance of escaping enemy bullets or shells.

Machines designed with this idea in mind were naturally not so strong as to satisfy condition (1), especially in view of the fact that they were so proportioned as to be very easy to manouver quickly, this throwing heavy air loads on the structure. Owing to the dearth of large, powerful engines, a few large bombing machines were so constructed as to satisfy condition (2); but had larger engines been available even these would probably not have done so. With regard to (3) some of the earlier machines, really pre-war machines, were most nearly capable of meeting this condition.

The leading difference between the war machine and the commercial machine of the future will be a reduction of speed. Although speed is one of the fundamental advantages of air travel over other forms of transport, we can well afford to give up some of the speed and still retain an advantage. Instead of designing for speeds of 120 to 160 m.p.h., we shall work for say 90 m.p.h. By this reduction we get available a good proportion of the weight of the engine, gasoline and tanks to reinvest in extra wing area and extra strength of members, thus tending to enable us to be able to claim condition (1) as satisfiable.

Coming next to the consideration of (2), the question as to whether multiple engines can be economically employed depends largely on the size of the airplanes. In order to transport a given load, say wt. lb., from some place A to another place B in a given time, we may break the load up into many small parts and transport by an equal number of small airplanes or put the load into a few large machines capable of carrying the whole load between them. In spite of numerous early mathematical predictions to the contrary, it is now a fact of experience that the large airplane has the ratio

$$\frac{\text{Useful load}}{\text{Total wt. of machine loaded}}$$

as great as the small machine over the range of airplane sizes we have actually built, say from 1500 lb. to 45,000 lb. total weight. This ratio is usually of the order of 3/7.

It is here assumed that the load is capable of any sub-

division, an assumption erring in favor of the small machine in two senses:

(a) The load may be in units too heavy for the small machines to take at all.

(b) The load may be of the nature of passengers of varying weight and, with small machines, it would be difficult to take advantage of the fact that the two passengers (wishing to be together for the trip) should weigh less than a two passenger machine was capable of taking; a third passenger, for example, could not be accommodated, as the extra weight or space available would not suffice.

Hence the large machine is inherently as good as the small machine and the next point of interest is evidently the question of relative commercial costs and rates.

The direct initial cost per pound gross weight of airplanes is probably about the same whether they be large or small, assuming that each is made in reasonable production quantity. If this be true, then the initial outlay for machines would be about the same whether several small machines were built or fewer large ones to carry the given load wt. daily from the one place A to the other place B. The large machine has not yet been made in production quantity but the writer sees no reason why there should not be equal percentage economy resulting if they were.

The cost of hangars required might possibly be larger for each pound of weight carried for the case of large machines, if hangars were provided to the same extent as necessary with small machines. But the protection required by large machines against the elements is less than for small machines and it has become recognized as a standard condition that very large machines must be capable of weathering out in the open. For this purpose, arrangements are provided so as to permit of the machine being anchored down at many points, the machines being placed in the line of direction of the wind with tails raised up to prevent tendency to lift on the part of the anchored machine. Hence, except at perhaps one central depot on the route, all that need be provided for large machines would be sheltering surroundings—perhaps taking advantage of natural "harbors" formed by hills or woods. In this case, the total hangar cost would be less per pound carried in the case of large machines.

The size of the aerodrome or landing field required might be larger for the heavier machines. This is somewhat counterbalanced, however, by the fact that the multi-engine machine can maneuver on the ground (using the engines unequally) in a surprising manner.

The Upkeep Cost

In view of the above considerations the total direct initial outlay is not greatly dependent on the size of machines chosen. The next matter is the extremely important question of upkeep.

The individual parts of the large machine are naturally more robust than those of a small machine. Further, it is possible, with advantage, to make many of the parts of a large machine in steel instead of in wood. Hence the danger of damage by rough handling of spare parts is less than for small machine components.

The number of individual components of the large machine are (for reasons of manufacture, erection, etc.) more numerous than is the case of the small machine. Hence the repair of local damage involves the replacement of little more than the damaged part itself. For example, in the wings of a small machine there are seldom more than four joints, namely, one on each side where the top wing joins the top center portion and one on each side where the lower wing joins the fuselage; whereas, in a large machine, it is desirable and convenient to divide up the wings more—say into ten parts. If the small machine were made similar in this subdivision respect to the large machines, the individual parts would either become inconveniently small and flimsy or the extra weight involved would be an important percentage addition. Hence it is evident that the upkeep cost of the large machine is much less per pound carried than is the case for small machines.

The Gliding Ratio

The large airplane with multiple engines is to a large extent immune from bad results arising from the ever present danger of engine failure since the failure of one engine out of, say, four merely involves a decrease in the speed traveled rather than certain descent with little time to choose the most advantageous landing ground on the country below. Even if two engines out of the four were completely to fail, the airplane, especially if nearing the end of a journey (and hence light owing to decreased gasoline weight), would be able either to continue and reach the objective or to glide very slowly, giving much greater time for choice of the landing place.

Let us take as an example the case where the gliding angle of the airplane is 1 in 8 when gliding at 60 m. p. h. (88 ft. per sec.). The machine thus is losing height at the rate of 11 ft. per second. Suppose the machine weight were 40,000 lb., then the horse power required to allow the plane to fly level at 60 m. p. h. is $\frac{550}{40{,}000 \times 11} = 800$ h. p., which would mean that two engines would be required. This assumes, for example, that the machine were equipped with four 500 h. p. engines. Under these circumstances the machine would be able to go on and reach her station, if gasoline supply permitted. If only one engine say of 500 h. p. alone were working, the angle of glide would be decreased from 1 in 8 to 1 in 16 and hence the ground area from which choice of landing may be made is increased by the use of one engine in the ratio $\left(\frac{16}{8}\right)^2$ or 4 times, the time of choice of landing spot being doubled. These figures would be easier to realize if the machine were fitted throughout with variable pitch propellers so as to enable maximum advantage to be taken of the remaining engines in case of need.

The extent to which capital will be put into commercial airplanes depends largely on the extent to which operation risks can be eliminated since it is greatly on this possibility that the minimum commercial rates to be charged to defray the expense of running an air line also depends. Reduction of these rates in turn reacts on the amount of business to be done at present and also on the rate of growth of airplane traffic.

The small single engined airplane as at present developed is a military instrument whereby it is possible to get from one place to another with a certain risk of failure not too great from a military standpoint. This risk increases the sporting element in flying such machines and, no doubt for this reason, and their low cost, they have a place in peace conditions under proper regulations. But for the development of the great commercial highway it is evident that we must look to the large multi-engined airplane.

THE London Daily Mail states that British business men are inclined to estimate the total loss to the nation through the recent railroad strike at approximately $250,000,000. Bills to be paid by the Government probably will amount to $5,000,000 for each day of the strike, covering a variety of services necessitated, in addition to unemployment pay of those made idle by the stoppage, numbering more than 335,000.

Energization of the Ignition Coil

Calculation of the time required for an induction coil to build up to different fractions of its maximum strength is taken up at length here by Mr. Geist. He also discusses the energy involved in the spark and the efficiency of sparking systems under different conditions.

By Harry F. Geist, E. E.

WHEN the circuit connecting an induction coil with a battery of electric cells is closed, a certain amount of time is required for the coil to become energized to the maximum possible under the existing conditions. This time depends upon the inherent electromagnetic characteristics of the combined circuit of coil and battery.

Where ignition sparks are required at a relatively high frequency, this time for energization is an important factor which has a direct bearing upon the battery economy of the system.

It is the purpose of this article to present a brief study of the principles and laws which have a bearing upon the rate of energization of an induction coil and to demonstrate the use of these laws by calculations made from an oscillogram which was taken as a measure of the rate of energization of such a coil in service. It includes also a study of the energy distribution during the complete operation of the system.

From the fundamental electrical laws, what is known as the time-constant of the circuit has been evolved. This expresses the time of electrical phenomena in terms of the circuit characteristics. It is the further purpose of this article to point out the marked difference between the rate at which electric current will increase or decrease in a circuit and the rate at which the corresponding energization or de-energization takes place and that the time-constant therefore which expresses the time of current phenomena will not correctly express the time of energization.

Current Flow

In Fig. 1 is shown a simple induction coil, consisting of a coil of insulated magnet wire interlinked with a magnetic circuit composed of sheet steel laminæ. This coil possesses a resistance R_c and an inductance L. This figure also shows, diagrammatically, the same coil in connection with a battery of cells and a make and break interrupter constituting, as a whole, a low tension battery ignition system. The battery has an electromotive force E and an internal resistance R_b. The interlinked windings and magnetic circuit of the coil constitute an electro-magnetic reservoir and it is the filling or the energy storing in this reservoir that requires time.

In general, when a constant voltage of value E is impressed upon a circuit containing a resistance R, resistance being the only characteristic of the circuit, the current I will rise to its maximum value instantaneously, according to the law

$$I = \frac{E}{R} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

But if the circuit contains self-induction or inductance, usually designated by L, which gives rise to a storage of electro-magnetic energy, the current will not rise to its maximum value instantaneously, owing to the fact that the building up and storing of energy requires time. The current, in rising to its maximum value, will follow a logarithmic curve, the time required for attaining its maximum value depending upon the proportions of R and L in the circuit.

To arrive at the relation between current and time, under the assumption of a constant battery voltage E, a constant total circuit resistance $R = R_c + R_b$ and a constant value of inductance L, as represented in the circuit diagramed in Fig. 1, the following deduction is made.

When the interrupter closes the circuit and the current commences to flow, the voltage E will be consumed by a resistance drop iR_b in the battery, a resistance drop iR_c in the coil or a total resistance drop iR and by a counter electromotive force set up in the coil as the magnetic field cuts across the turns of coil during the building up of the energy. This counter e.m.f. is set up in accordance with Henry's law which states that, if a current is flowing in a circuit having a coefficient of self-induction of one henry and changing in value at the rate of one ampere per sec-

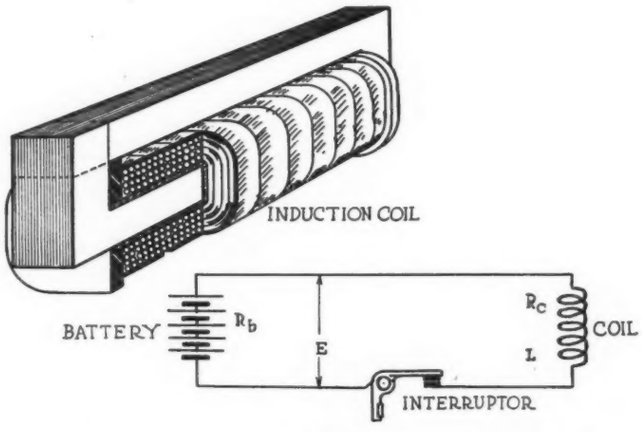


Fig. 1—Battery coil and interrupter constituting low tension ignition system

ond, a counter e.m.f. of one volt will be induced in the circuit. Mathematically this law is expressed by

$$e = L\frac{\delta i}{\delta t} \quad \ldots\ldots(2)$$

where e expresses the counter e.m.f. and $\frac{\delta i}{\delta t}$ the rate of current change at any instant. This induced counter e.m.f. will have a polarity such that it tends to oppose current changes.

The voltage equation for the circuit following the closing of the interrupter can therefore be expressed at any instant by

$$E = iR + L\frac{\delta i}{\delta t} \quad \ldots\ldots(3)$$

where i designates the current at any instant.

By rearranging equation (3) to

$$\frac{\delta i}{\delta t} + \frac{iR}{L} = \frac{E}{L} \quad \ldots\ldots(4)$$

we have a linear differential equation of the first degree. Under the assumption that E, R and L are constant under the known condition that i will be zero in value when t is zero, i. e., at the instant of circuit closing, the solution of equation (4) gives the following relation between i and t—

$$i = \frac{E}{R}\left(1 - \epsilon - \frac{Rt}{L}\right) \quad \ldots\ldots(5)$$

where ϵ is the base of the Naperian system of logarithms and is numerically equal to about 2.7183, and $\frac{E}{R}$ is the maximum value to which the current will rise.

According to equation (5), the current i never reaches its maximum value, but in the actual phenomena it does so in a few hundredths of a second in the usual circuit. The difference between the actual and the theoretical phenomena will be pointed out later. (See Fig. 3.)

From equation (5) we now derive an expression for what is known as the time-constant of the circuit, which is an arbitrary factor indicative of the alertness or sluggishness of a circuit, expressed in terms of its resistance and inductance. This expression is

$$t\ (\text{seconds}) = \frac{L\ (\text{henrys})}{R\ (\text{ohms})} \quad \ldots\ldots(6)$$

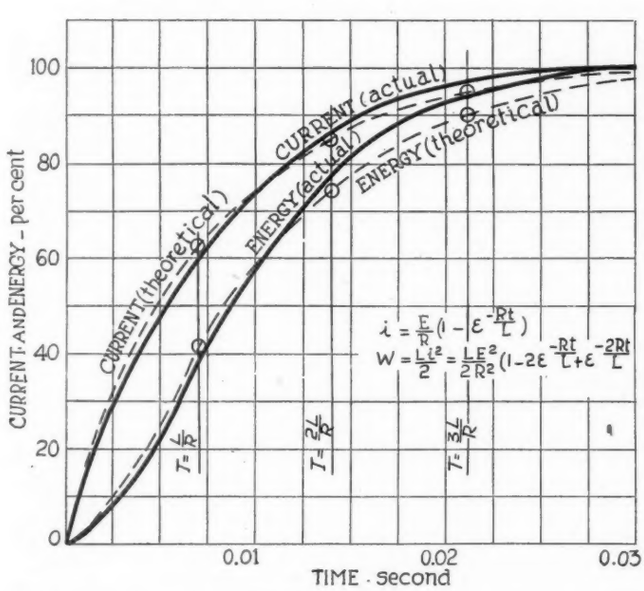


Fig 3—Curves showing difference between current and energy increase for the actual and the theoretical phenomena

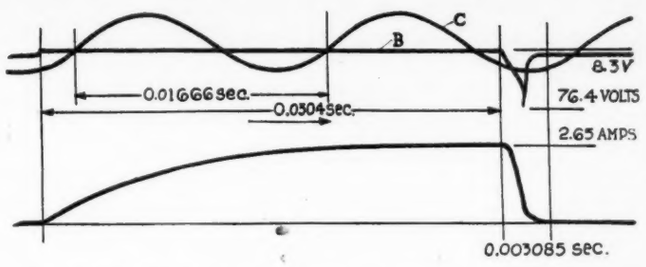


Fig. 2—Rise and fall of voltage and current in spark circuit

By substituting the value of t in equation (6) for t in equation (5) we obtain

$$i = \frac{E}{R}\left(1 - \frac{1}{\epsilon}\right) = 0.632\frac{E}{R} \quad \ldots\ldots(7)$$

which shows that L and R determine the time in seconds for the current to reach 63.2 percent of the maximum value I that it would have attained instantaneously under the conditions of equation (1). It is very evident, therefore that inductance and its attending energy storage capacity have a marked effect upon the behavior of the circuit, tending to retard its action.

While equation (6) expresses the time required for the current to build up to a certain definite percentage of its maximum value, current is only one of the components of energy, so that it does not form a true criterion of the rate at which a coil will be energized.

Energy

From the electromotive-force equation (3), the power equation of the circuit is obtained by multiplying by i, and is as follows:

$$p = Ei = i^2R + Li\frac{\delta i}{\delta t} \quad \ldots\ldots(8)$$

The energy transferred during any period t following the closing of the circuit is

$$W = \int_0^t Ei\,\delta t = \int_0^t i^2R\,\delta t + \frac{Li^2}{2} \quad \ldots\ldots(9)$$

in which the relation between i and t is that represented in equation (5).

Equation (9) shows in its first term the total amount of energy expended by the battery, in its second term the energy lost in the circuit resistance and in its last term the energy stored in the coil. Note that the stored energy is independent of time and depends for its value upon the current flow and the inductance.

These terms expanded give the energy expended by the battery as

$$W = \frac{E^2}{R}\int_0^t \delta t - \frac{E^2}{R}\int_0^t \epsilon^{-\left(\frac{Rt}{L}\right)}\delta t$$

$$= \frac{E^2t}{R}\Big]_0^t + \frac{E^2L}{R^2}\epsilon^{-\frac{Rt}{L}}\Big]_0^t \quad \ldots\ldots(10)$$

and the energy consumed by the resistance of the circuit

$$W_r = \frac{E^2}{R}\int_0^t \delta t - \frac{2E^2}{R}\int_0^t \epsilon^{-\left(\frac{Rt}{L}\right)}\delta t + \frac{E^2}{R}\int_0^t \epsilon^{-\left(\frac{2Rt}{L}\right)}\delta t$$

$$= \frac{E^2t}{R}\Big]_0^t + \frac{2E^2L}{R^2}\epsilon^{-\left(\frac{Rt}{L}\right)}\Big]_0^t - \frac{E^2L}{2R^2}\epsilon^{-\left(\frac{2Rt}{L}\right)}\Big]_0^t \quad \ldots\ldots(11)$$

and the energy stored at any instant is

$$W_e = \frac{L E^2}{2 R^2}\left(1 - 2\epsilon^{-\left(\frac{Rt}{L}\right)} + \epsilon^{-\left(\frac{2Rt}{L}\right)}\right) \ldots\ldots (12)$$

To arrive at an idea of the rate at which the energy builds up in the coil, equation (6) is substituted in (12), giving

$$W_e = \frac{L E^2}{2 R^2}\left(1 - \frac{2}{\epsilon} + \frac{1}{\epsilon^2}\right)$$
$$= 0.4\left(\frac{L E^2}{2 R^2}\right) = 0.4\ W_e \ldots\ldots (13)$$

where W_e is the maximum possible amount of energy that can be stored in the coil under the assumed conditions.

A comparison of equations (7) and (13) shows that for the same period of time represented in equation (6) the current will build up to 63.2 percent of its maximum, while the energy will build up to only 40 percent of its maximum. This comparison shows the error that might be made by confusing current phenomena and energization.

Time-Constants

It is evident that the time-constant of equation (6), which represents the time required for the current to rise to 63.2 percent of its maximum value and energization to 40 percent, does not allow for a sufficient percentage of the completion of the phenomena to be of much value, so that the following time-constants are suggested.

$$T = \frac{2L}{R} \ldots\ldots (14)$$

which substituted in equations (5) and (12) gives the time for the current to rise to 86.4 percent of its maximum and for the energy stored to attain 74.6 percent of its maximum. The time-constant

$$T = \frac{3L}{R} \ldots\ldots (15)$$

in a like manner represents the time for the current to rise to 95.0 percent of its maximum and for the energy to attain 90.25 percent of its maximum. From these suggestions it is apparent that any time-constant desired can be selected for determining the circuit characteristics for any particular time allowance in a system.

In order to show how the actual phenomena obey the above laws and principles, the oscillogram Fig. 2 is presented. This oscillogram shows the voltage and current phenomena covering the complete make and break of a low tension battery ignition system, such as shown in Fig. 1. The coil used was of the same general design as that shown in that figure.

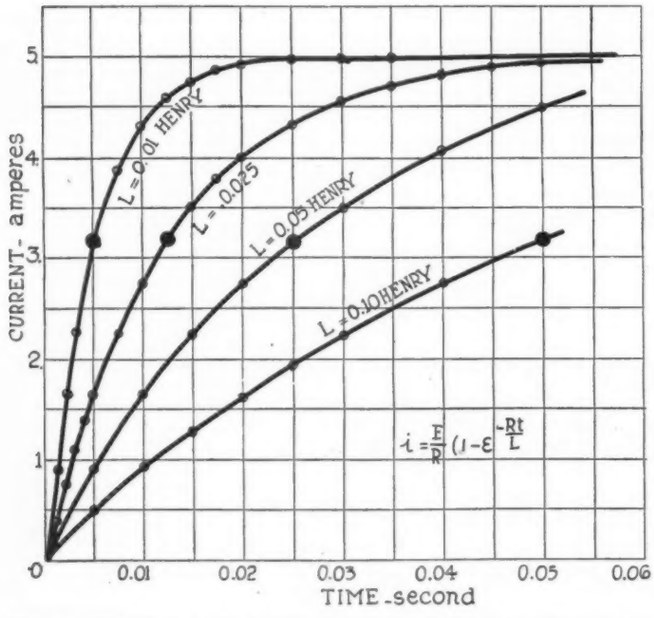


Fig. 4—Effect of inductance on energy rise and energy value

This oscillogram was taken with the film drum of the oscillograph rotating at a relatively high speed so as to draw the time ordinate of the curve out sufficiently to make time measurements from the record possible with a fair degree of accuracy. In this record, curve A shows how the current rose from zero, beginning at the instant of make and reaching a practically constant maximum value of 2.65 amperes after an interval of 0.0304 second from the instant of closing the circuit, interruption took place, following which the current dropped to zero, forming a low-tension ignition spark that lasted about 0.003085 second.

Curve B shows how the voltage, which was measured across the interrupter points, dropped to zero at the closing of the points and remained at zero value until the period of sparking. During the sparking period an induced voltage of 76.4 maximum was reached momentarily, after which the voltage dropped off to a value of 8.3 which was the open circuit potential of the battery used.

Curve C is a record of a 60-cycle alternating lighting supply circuit taken as a time calibration of the oscillogram, a period of 0.01666 second being laid off as shown.

This oscillogram contains all the necessary data for making a thorough check of the energy expended by the battery during the complete phenomenon of producing one spark; of the amount of energy lost in the circuit resistance; the amount of energy stored available for the spark; the energy delivered to the spark, and the energy losses in resistance and iron during sparking.

The total circuit resistance, including battery, coil leads and measuring rheostat, is obtained by dividing the 8.3 volts by the maximum current of 2.65 amperes, which gives about 3.13 ohms. This is under the assumption that 2.65 is about the maximum value to which the current could have risen under the existing conditions. See equation (1).

The inductance of the coil was obtained by impressing a 60-cycle practically sinusoidal alternating voltage of known value upon the coil and measuring the resulting current, taking care that the resultant magnetic density in the coil does not exceed the working density of the coil in service. The inductance was then calculated from the relation between the total impedance and the pure resistance, i. e., by the reactance method.

As a check upon this method, the inductance was also calculated from the current rise curve of the oscillogram, by the use of equation (5) rearranged to the form

$$L = Rt \frac{\log. \epsilon}{\log.\left(\frac{E}{E - iR}\right)} \ldots\ldots (16)$$

By making measurements of the current for different instants along the record and substituting in equation (16), an average of a series of results was obtained which agreed very closely with that received by the previously mentioned method. The average inductance of the coil was about 0.0221 henry.

It was found in checking the inductance by the use of equation (16) that the inductance for the earlier positions along the current rise was somewhat higher than that after the current had risen well toward its maximum. The difference is due to the fact that the increasing magnetic density in the coil core changes the per-

meability of the magnetic circuit and thus reduces the inductance.

The characteristics of the circuit are taken as R = 3.13 ohms and L = 0.0221 henry.

Figure 3 illustrates the current rise on a percentage basis during the period of closed circuit and is based on the oscillogram Fig. 2. The diagram also includes an energization curve calculated from the current curve, which shows the relation of the energy to the current at any instant. Along with these two curves their theoretical equivalents are diagramed, as calculated by means of equations (5) and (12) for the values E = 8.3 volts, R = 3.13 ohms and L = 0.0221 henry, assuming different values of t.

The instants represented by the different time-constants as per equations (6, 14 and 15) are also shown to indicate the percentage of phenomena completion for both the current and energy curves.

It may be of interest to see just how much energy is required from the battery for the production of one spark. By substituting the values of E, R and L in equation (10) over the closed circuit period between t = 0 and t = 0.0304 second, the amount of energy theoretically expended by the battery is

$$W = 0.508 \text{ joule}$$

and the energy consumed by the circuit resistance as obtained by substitution in equation (11) is

$$W_r = 0.425 \text{ joule.}$$

The energy stored and available for the spark at the instant just before break of the circuit is obtained from equation (12) or more readily from $W_c = \frac{L i^2}{2}$ and is

$$W_c = 0.083 \text{ joule.}$$

These results, obtained by the use of theoretical equations, will agree as closely with the actual phenomena as the theoretical and actual curves of Fig. 3 agree. The above energy distribution does not include iron losses, which are assumed negligible for the comparatively slow rate of energization which took place in the case under consideration.

A study of the above results shows that after 0.0304 second of closed circuit, the energy available for a spark is only 16.3 percent of the total energy expended by the battery. It is, furthermore, evident that the amount of stored energy is about the maximum possible for the coil under the operating conditions, so that an increase of the time for closed circuit will not increase the stored energy, but will, on the other hand, increase the energy expended by the battery and that expended in overcoming the resistance very rapidly. A much greater economy would have resulted, without an appreciable sacrifice in the amount of stored energy, had the circuit been closed for a shorter time, say in the neighborhood of 0.020 second.

For a period of closed circuit of 0.020 second, the actual energy expended by the battery is about

$$W = 0.284 \text{ joule}$$

and the energy stored is

$$W_c = 0.0794 \text{ joule.}$$

With this shorter period of closed circuit, the available stored energy is 27.9 per cent of the energy expended, showing a much better battery economy than for the case where the closed circuit lasted 0.0304 second. It is evident from the above that the period allowed for the coil to energize is a very important consideration from the standpoint of battery economy.

The oscillogram Fig. 2 also contains sufficient data for a study of the energy expenditure during spark. At the

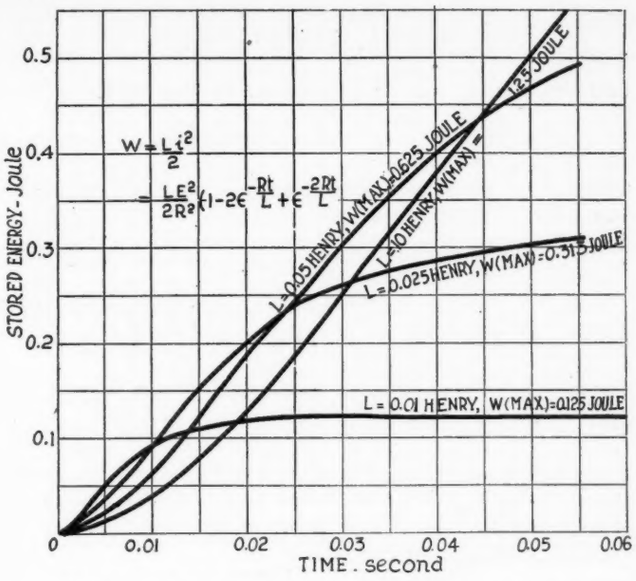


Fig. 5—Effect of inductance on energy rise and value

instant of metallic circuit break, the energy stored in the coil will begin to dissipate itself in the form of an electrical arc or spark at the point of break. But the spark forms a circuit for current flow after the metallic break, with the result that energy will continue to be supplied by the battery during the period of sparking. The total energy involved during sparking is therefore expressed by

$$W' = \frac{L I^2}{2} + \int_0^t E\, i\, \delta t \quad \ldots\ldots\ldots\ldots\ldots\ldots (17)$$

where I is the maximum current just before break, and i is some function of t during the life of the spark.

This energy expends itself as per the following equation,

$$W' = \int_0^t e_s\, i\, \delta t + \int_0^t i^2 R\, \delta t + W_r \quad \ldots\ldots\ldots (18)$$

where the first term represents the energy appearing in spark heat, the second term is the energy lost in overcoming resistance and W_r is the energy lost in the iron, while e_s is the voltage across the interrupter points as indicated in the oscillogram, which equals the sum of the induced voltage and of the battery voltage.

Equations (17) and (18) combined represent the complete energy distribution for the sparking phenomena.

By taking the product of simultaneous current and voltage values at measured instances during the sparking period, which lasted 0.003085 second, the power curve of the spark is obtained, following the law $p_s = e_s\, i$. An integration of such a curve, calculated from the oscillogram, gives the energy expended in the spark as

$$W_s = \int_0^t e_s\, i\, \delta t = 0.0683 \text{ joule.}$$

This value represents the heat of the spark, which reached a maximum power of 60.0 watts.

The above suggested method of spark heat and power determination is shown more in detail by the writer in an article, "Sparking Power of Magnetos," published in Automotive Industries, Vol. XL, page 949, reference being made more particularly to Fig. 6 of that article.

By the same general method, the energy delivered by the battery to the spark directly, during the period of sparking is found to be

$$W_{bs} = \int_0^t E\,i\,\delta t = 0.0238 \text{ joule}$$

and the energy lost in resistance during sparking to be

$$W_{rs} = \int_0^t i^2 R\,\delta t = 0.0182 \text{ joule.}$$

The difference between the total energy supplied during the spark cycle and that accounted for as dissipated gives the amount of iron loss incidental to sparking, as

$$W_i = 0.0203 \text{ joule.}$$

The total energy supplied to the spark circuit is according to equation (17)

$$W' = 0.083 + 0.0238 = 0.1068 \text{ joule.}$$

The above values give a very complete analysis of the energy distribution for the sparking phenomena of the system.

The efficiency of the sparking performance of the coil is obtained by dividing the actual spark heat by the energy supplied to the spark circuit and is

$$\frac{0.0683}{0.1068} = 64.0 \text{ percent.}$$

The efficiency of the complete system covering the make and break of the circuit is obtained by dividing the actual spark heat by the total amount of energy expended by the battery.

This total energy delivered by the battery is the sum of the energy delivered during closed circuit and that delivered during sparking, or

$$W_{total} = 0.508 + 0.0238 = 0.5318 \text{ joule.}$$

The efficiency of the complete action of the system as recorded by the oscillogram Fig. 2 is therefore

$$\frac{0.0683}{0.5318} = 12.85 \text{ percent.}$$

This efficiency, it is seen, is very low. The cells used were of the ordinary dry type, which have considerably more internal resistance than is found in storage cells, so that the use of storage cells would have given much better results.

For high tension coils, the magnetic circuit consists usually of a straight bar of laminated or bundled iron stock, about which is first wound a primary winding, similar to that of Fig. 1, and upon which is also wound a secondary winding. A condenser is shunted across the breaker to prevent arcing at the breaker points, and to enhance the magnetic action that induces the high potential in the secondary winding for the production of a high tension spark.

Because of the fact that the magnetic circuit does not form as complete a link with the windings as is true of the coil of Fig. 1, the inductance of the primary circuit is very much reduced. The result is that the primary of such a coil will energize much more quickly, making the system especially suitable for the delivery of sparks at a high frequency. The amount of stored energy available for the spark will, however, be reduced accordingly, for any particular value of current flow. This is not necessarily a decided disadvantage, because high speed engines do not usually require as much ignition spark heat as the slower speed engines.

Another reason why high tension type coils are not made with a closed magnetic circuit is that such a circuit would have sufficient dampening effect upon the secondary circuit to render it too slow to receive the energy from the primary circuit for delivery to the spark. A coil of such design would arc very severely at the breaker points.

In order to convey an idea of the difference in the behavior of primary circuits under different characteristics, Fig. 4 is presented, showing the current rise for four different values of inductance. The values $E = 10.0$ and $R = 2.0$ are assumed throughout the calculations. The heavy dot in each case marks the instant after closing of the circuit, represented by the time-constant of equation (6).

The energy curves calculated for the same assumed values are shown in the diagram Fig. 5, which shows the marked difference in the maximum value of stored energy that results from a change in the inductance value.

While the above principles have been treated as pertaining to ignition systems, they are equally true for all coils regardless of the purpose for which they are designed.

American Advertising in the Netherlands

AMERICAN manufacturers and exporters advertising in the Netherlands will find known in that country all forms of advertising practiced in the United States, according to Trade Commissioner A. H. Redfield. The use of daily newspapers, window poster displays, street cars, moving signboards, electric signs and novelties is widespread. The daily press plays the largest part. Posters are usually 30 by 36 in. in size.

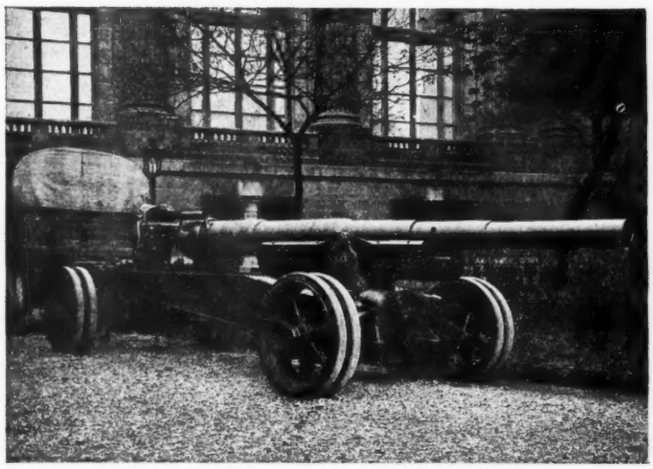
The best policy for the American advertiser, according to the manager of a well-known Dutch advertising concern, is to place its advertising in the hands of some reputable Dutch advertising agency. There are several reasons for this. In the first place, an agency established in this country is better acquainted with the advertising value of a given publication than a customer 3,000 miles away. There is no law in the Netherlands, as in the United States, requiring periodicals to make a sworn statement of their circulation and penalizing them for misstatement. Consequently the less conscientious publications will claim large circulations, while the best known and most patronized journals of the country never give out any statement as to their clientele.

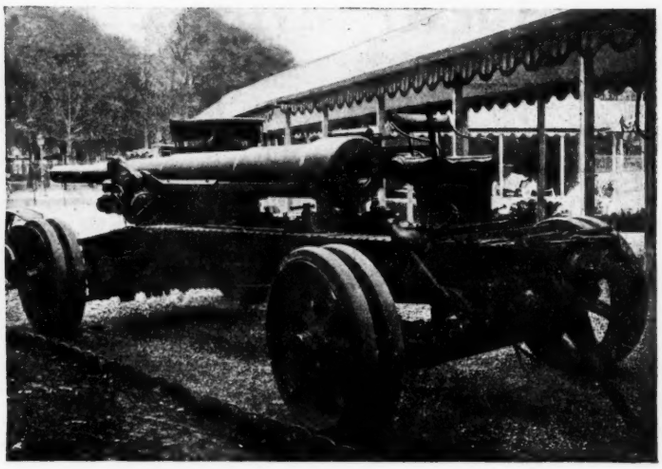
As in every country, national psychology plays a considerable part in the preparation of advertising copy. American advertisers would do well to confine their appeal to the obvious, not from any lack of a keen perception on the part of their readers but from a difference in the customs and viewpoint of the two nations. Many allusions that would appeal to the American purchaser would be lost in the Netherlands because conditions and customs of life are different.

On the whole advertising rates are cheaper in the Netherlands than in the United States. The territory is small and compact. In an area a little larger than that of the State of Maryland is found a population of 6,773,672, of whom one-fourth live in communities of over 20,000 inhabitants. The big city dailies are read in the smallest towns, which, in fact, are only a few hours by rail from Amsterdam or Rotterdam. Full-page or half-page advertisements are not very frequently seen. Accordingly, Americans accustomed to big-scale advertising would find their methods all the more effective.

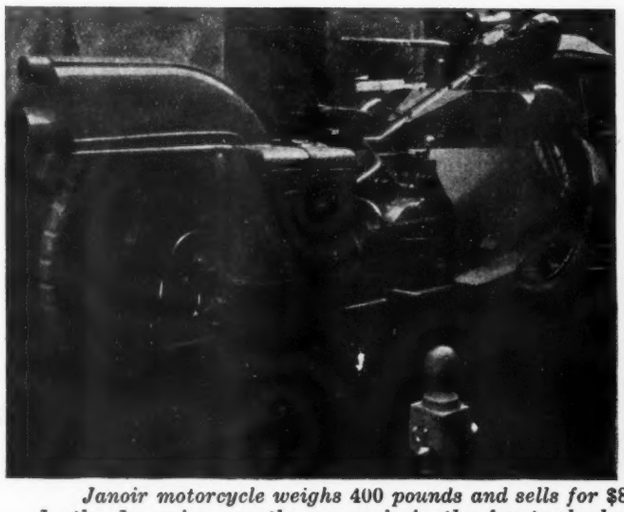
It is not advisable to send cuts ready-made from the United States.

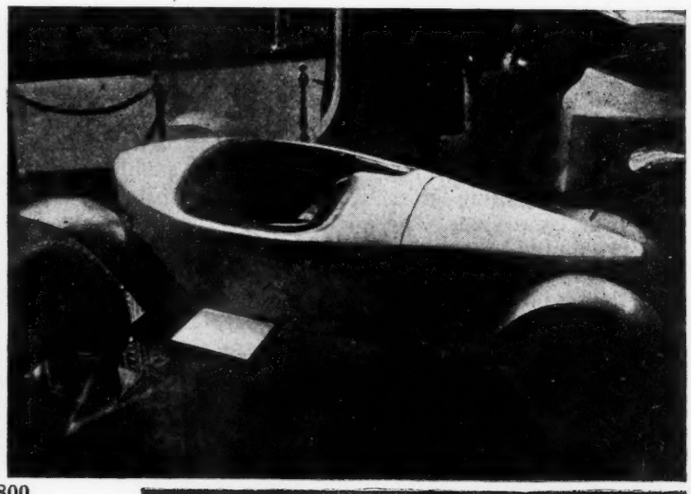
Some Unusual Exhibits at the Recent Paris Show



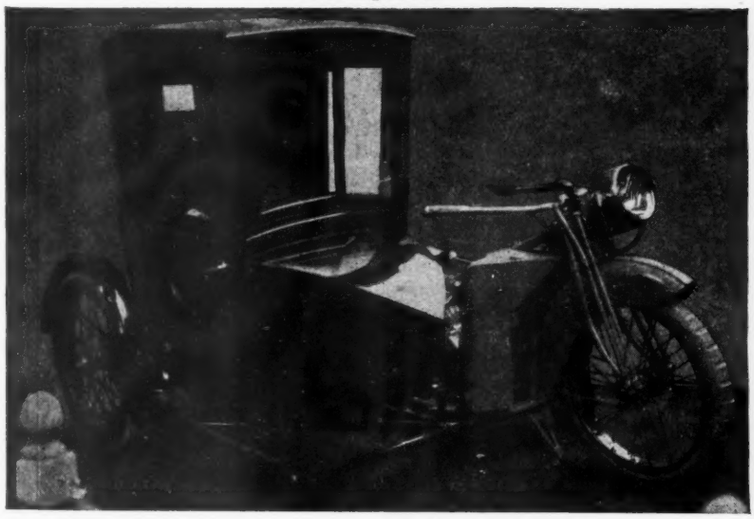


Not in big demand—automobile type of gun carriage





Janoir motorcycle weighs 400 pounds and sells for $800
In the Janemian car the power is in the front wheels, placed close together



This Janoir motorcycle was called a Louis XV model

A Bleriot sidecar for a motorcycle

Gear Makers Adopt Standard Contract

After two years of consideration, the American Gear Manufacturers' Association gets its standardization work under way by fixing contract form and by setting design standards for composition and bevel gears. The proceedings at the recent Boston convention are given herewith.

CLOSING sessions of the American Gear Manufacturers' Association, the convention of which has just been held at Boston, were devoted to the adoption of committee reports and of standardization details. Chief among these committee reports was that of the Committee of Commercial Standardization, presented by Charles Crofoot, the chairman.

Mr. Crofoot said that the committee made its initial report at the Cleveland meeting last spring, but this was returned to it "all shot to pieces," as one member put it. The committee then set to work to revamp it, holding a number of meetings, the last one at Jackson, Mich. Two forms had been sent out for approval to the membership, one being a regular letter-size form and the other one a larger or legal size. The advantage of the former was that if adopted the proposals could be filed with the regular correspondence, while the larger size had the advantage that it offered more space for a detailed enumeration of the goods to be furnished, and for possible sketches.

The proposal form, as drawn up by the committee, was gone over in detail item by item, and was finally definitely accepted with a considerable number of changes, most of which, however, were only a matter of terminology. The proposal form as adopted is substantially as follows:

No.....

Proposal Form
BLANK GEAR & MACHINE CO.
Blank, Blank
Date .....

To The Blank Machine Co. (hereinafter called the purchaser).

The Blank Gear Co. (hereinafter called the company) proposes to furnish complete or otherwise, as specified in detail, the following items at prices and subject to conditions named herewith:

Acceptance Limit—This proposal must be accepted in 10 days from date hereof.

Delivery—This quotation is based on delivery f. o. b. factory. Responsibility of company shall cease upon delivery to and receipt by a common carrier.

The company shall not be held responsible or liable for any loss or detention or delay caused by fire, strike, civil or military authority, or by insurrection or riot, or by any other cause which is unavoidable or beyond its reasonable control.

Receipt of the material by the purchaser upon its delivery shall constitute a waiver of all claims for loss or damage due to delay.

Deliveries of work done on material furnished by purchaser are based on material being received at an agreed upon time and in quantities and condition specified.

Terms of Payment—All invoices shall be due and payable in net cash thirty days from date of invoice.

A discount for prepayment will be allowed as follows: Invoices dated from the 1st to the 15th inclusive may be paid on or before the 25th of the same month, less 1 per cent. Invoices dated from the 16th to the last day of the month may be paid on or before the 10th of the succeeding month, less 1 per cent. Legal rate of interest will be charged on all overdue accounts.

Delays in transportation shall not extend terms of payment.

In case of refusal or inability of purchaser to accept any shipment in accordance with the terms of his order or contract, the purchaser shall be held liable for all freight, express, storage, extra cost of handling and other expenses that may be incurred thereby.

Should the purchaser's financial responsibility become unsatisfactory to the company, cash payments or satisfactory security may be demanded by the company, and in default of such cash payment or satisfactory security, deliveries hereunder may be discontinued at the option of the company.

Guaranty—The company guarantees its product for the period of one year against defects in material and workmanship, except rawhide, fibre and other non-metallic materials, and has the right to replace any product proving defective.

This proposal is based on furnishing a product that will conform to such standards of design, workmanship and material as have been adopted by the American Gear Manufacturers' Association, which shall govern, unless otherwise specified.

Claims—In case goods are rejected on inspection by the purchaser as defective, the company shall be notified in writing within ten days from receipt of material. It shall then have the option of reinspection at the purchaser's plant or its own before allowing or rejecting the purchaser's claim.

Expenses incurred in connection with claims for which the company is not liable shall be charged to the purchaser.

No claim for remachining will be allowed, except for work done with the written consent of the company.

Defects that do not impair service shall not be a cause for rejection. The company assumes no liability in any event for consequential damages.

No claim will be allowed for material mutilated by the purchaser or damaged in transit.

Where the purchaser furnishes the material and it proves defective or involves expense not contemplated by the contract, the company will invoice for all expenses involved up to time of the discovery of the defect.

Alterations—No alterations in specifications, either for total quantity, delivery, mechanical, chemical or other details, may be made without written consent of the company and readjustment of price.

Instructions from the purchaser to hold up work or to cancel an order, may, at the option of the company, entitle him to an adjustment charge.

Patents—The company assumes no liability, unless agreed upon in writing, for any claim for infringement of any patent.

This proposal shall not be valid unless signed by an executive officer of the company.

Respectfully yours,
BLANK GEAR & MACHINE COMPANY,
By .....

ACCEPTANCE

The foregoing proposal is hereby accepted at the prices and upon the terms and conditions named therein.

Date .....

.....

(Purchaser signs here)

.....

(Title)

BLANK GEAR & MACHINE COMPANY

By .....

Approved

Date

Chairman B. F. Waterman of the Standards Committee made the second annual report of that committee. He said that a year ago at Syracuse the committee outlined in some detail a plan for standardizing cut gearing. A mid-season meeting of the Standards Committee was held at Buffalo which was very well attended, 23 out of a total of 41 committee members being present. Four different sets of recommended practices were evolved, and printed sheets containing these were distributed among the members at the Cleveland meeting. Three of these proposed recommended practices would be submitted to vote at the meeting. Waterman then read a set of rules and definitions for guidance in the work of standardization. These were accepted by the Association. The rules and definitions are as follows:

In considering the recommendations, it is well to have in mind the four possible ways that they may be used:

1. As "Adopted Standards."
2. As "Recommended Practice."
3. As "Suggested Standards for Future Design."
4. As "Departures from Adopted Standards."

The definition of the foregoing methods of use and the rules governing them are as follows:

1. Adopted Standards:

(a) Any rule, definition, practice or basis of test adopted by the American Gear Manufacturers' Association as a definite standard shall be known as an "Adopted Standard."

(b) Adopted Standards shall be adopted only upon unanimous vote of the members present at a general meeting, following four weeks' notice. Notice must state specifically that the rule is being recommended as an Adopted Standard.

(c) References in the handbook to date of adoption and identification as an adopted standard shall be placed below rule in small type in the following form:

Adopted June 15, 1920

or

Adopted June 15, *to take effect Jan.* 1, 1921

(d) Except when specifically authorized under the provision of Section IV, there shall be no departure from the adopted standards of the American Gear Manufacturers' Association.

(e) An adopted standard may only be rescinded or amended following four weeks' notice, by a two-thirds vote of the entire membership, or upon unanimous vote of the members present at a general meeting.

(f) Gears made in compliance with the adopted standards of the American Gear Manufacturers' Association may bear a distinguishing mark to this effect.

2. Recommended Practice:

(a) Any suggestion or practice with reference to which it is impracticable to require rigid acceptance by each member of the American Gear Manufacturers' Association, but with reference to which it is desirable to recommend uniform practice, shall be approved and known as "Recommended Practice."

(b) Recommended Practice shall be adopted only upon two-thirds vote of the members present at a general meeting, following four weeks' advance notice. Notice shall state specifically that the rule is being submitted as Recommended Practice.

(c) Reference in the handbook to date of approval and identification as Recommended Practice shall be placed below the rule in small type in the following form:

Recommended Practice, June 15, 1920

(d) Suggestions of Recommended Practice may be rescinded or amended by a majority vote of those present at any general meeting, following four weeks' advance notice.

3. Future Design:

(a) Any rule or standard which cannot be approved either as an adopted standard or as recommended practice, but is merely recommended for future designs, shall be adopted and known as a "Suggested Standard for Future Design."

(b) The same vote is required for Suggested Standards for Future Design as specified for Recommended Practice.

(c) Suggested Standards for Future Design, showing date of adoption, shall be printed on buff-colored paper for the loose-leaf handbook.

(d) Suggested Standards for Future Design can be rescinded or amended by majority vote of those present at any general meeting, following four weeks' advance notice.

4. Departures from Adopted Standards:

(a) It is recognized by the members of the American Gear Manufacturers' Association:

(1) That the advance of the industry, the progressive development of the art of manufacturing gears or gear cutting machinery, or the rewards to which individual members are properly entitled as the result of initiative, research and invention must not be retarded or curtailed by adopted standards to which the majority still subscribe; (2) that during a period of change or progressive development, honest differences of opinion may arise over a proposed change or departure from an existing standard; and (3) that where there is reasonable evidence that such a change is in the public interest, it is desirable that the departure be formally authorized, so that its merits may be conclusively demonstrated and so that the member or members advocating the change and the balance of the industry may not be deprived of the co-operative benefits which naturally and properly accrue from their continued joint membership in the American Gear Manufacturers' Association.

(b) Application for recognition in respect to a departure from the adopted standards of the American Gear Manufacturers' Association shall be made in writing and shall be filed with the Secretary sufficiently in advance of commercial introduction to permit of thorough investigation and the exercise of mature judgment, and when so filed shall receive prompt consideration.

(c) Upon favorable recommendation of the Executive Committee, approved by a two-thirds vote of the entire membership, a departure may be authorized subject to such conditions as may be prescribed in each instance.

The report of the Bevel Gear Committee contained a table giving the horsepowers which can be transmitted by bevel gears having a ratio of 1:2 and over, and miter gears, of 5 diametral pitch and various numbers of teeth in the pinion. This table was based on the Lewis formula and on a stress of 18,000 lb. per square inch, which is thought to be suitable for medium carbon soft steel. The table was referred back to the committee for further consideration.

A table of horsepowers transmitted by shafting made of medium carbon steel, for use in connection with bevel gears, was adopted. This table was taken from Machinery's Encyclopedia and is based on a stress of about 4600 lb. per square inch. The committee suggests that these sizes be regarded as the smallest limit and that designers of gear drives should use even larger sizes to be on the safe side. The importance of making the overhang of bevel gears on bearings as short as possible should be made clear to the customer in every case. Short backings will help this.

With regard to length of face of bevel gears the following was adopted as recommended practice:

The maximum length of face of bevel gears should not be over one-third the cone distance for gears up to 3 in. pitch diameter, and not over one-quarter the cone distance for gears from 3 in. to 20 in. diameter. This is assuming that the pitch in every case will be in proper proportion to the size of the gears. A safe rule would be to make the face one and one-half to two and one-half times the circular pitch.

The recommendation regarding length of tooth bearing

(Continued on Page 833*)*

The Employer's Duty in Dealing With Labor

Continuing his appeal for legislative labor machinery within each factory organization, Mr. Tipper points out the futility of general settlements of labor difficulties. The employees and the employers of individual factories must work, one with the other, to obviate broken contracts and excessive demands from labor and to assure justice from the organization head. This article is one of the strongest contributed by Mr. Tipper for many weeks

By Harry Tipper

FROM time to time we have referred to the internal politics in the labor ranks and the present confusion in labor organizations resulting from the intensity of this political conflict. The matters which have developed in connection with the steel strike during the Senate investigation of this matter, the condition exhibited in the longshoremen's strike in New York, the fight between rival leaders in the printers' strike and the record of the number of strikes which have occurred without the authorization or the approval of the federation officials indicate the extent to which the ideas concerning the purpose and development of the labor organization have been confused by the events during the war and since the armistice.

It is impossible, in estimating the present unrest, to divorce the ambitions of the various leaders from the real demands of the workers in connection with these strikes. There is little doubt that many of the labor leaders have personally embraced the socialistic doctrines of political economies and many others have carried this belief to the extreme creed of the Revolutionary Socialist.

The trade union idea in its development has quite a good deal in common with the socialistic idea which has found a great deal of encouragement at its hands. It is obvious that the rank and file of the skilled workman and the general laborer who have been involved in these various strikes are not personally interested in the ultimate demands which have been presented in most of the strikes, but are merely interested in making as good a bargain as they can out of the present advantage they possess.

The political creeds, ideas and ambitions of the leaders carry them to the point of using the machinery of labor organizations for the purpose of furthering their own desires, or for the purpose of aiding factional opposition within the labor ranks. Naturally the men who have a large following within labor organizations are conscious of power, and see possibilities of seizing this power to develop their economic and political ideas and, consequently, their own ambitions in connection with industrial reconstruction.

For these reasons great care should be taken to differentiate between the statements of the leaders as to what the men have demanded and the actual state of information in the rank and file itself. There are many cases on record during the last two years where strikes have been continued for a number of weeks by the power of the leaders and their own political ideas, when the rank and file of labor involved were ready to agree to a similar program to that which the manufacturers had considered offering them. It should be patent to every manufacturer that a considerable proportion of the successful political leaders in labor organizations are not concerned with industrial peace, nor are they concerned with merely carrying out the wishes of the rank and file of their organization. They are more directly concerned with seizing upon the present opportune time to carry out political and economic theories which had been growing up in their minds for years, and which they are prepared to put into practice at any time that they should secure the power.

The confusion in the labor politics and the present tendency for labor leaders to use their organization power to foster demands way beyond the desire of the rank and file emphasize the necessity for the manufacturer establishing relations of confidence and trust with his own employees and providing for them machinery through which they can discuss all matters pertaining to their own conditions with him or with his responsible managers. Many of the present strikes would have failed to come into existence at all if there had been already working organization machinery of this kind in a decent proportion of the individual manufacturing units involved.

The allegiance to a labor organization is strong, but the allegiance to a personal leader is much stronger. It is only because of their failure to find personal leaders in industry in whom they could trust that the skilled workman follows his local labor leader blindly, without any real understanding of the consequences.

The condition of affairs which has arisen by the natural breakdown of labor organization discipline and the development of the individual labor leaders' political ambitions make it impossible to bargain collectively with a labor organization, and at the same time make it impossible to plan for the future without any such collective

bargaining basis. The conditions are more chaotic than they have been at any time in the last ten years. The rank and file of labor have learned the value of collective bargaining and the power of organization in enforcing their demands.

They have not yet learned that discipline within their own organizations is one of the reasons for that power and that the power itself will exist only so long as discipline can be preserved. Labor organizations which have had the proud record of living up to agreements with their employers for ten, fifteen or twenty years are obliged to face the automatic breaking of their contracts by the lack of discipline within their own ranks and the factional divisions among the leaders. For the time being, the manufacturer is in a position which makes it impossible for him to bargain effectively with the conservative leaders of labor or with those who have for the moment secured the power of the conservative leader and wrecked the discipline of the organization.

The Employer

In the long run, if the manufacturer is intelligent enough to seize upon the opportunity and to deal with it in a broadminded, just and patient manner, he can use the present lessening of allegiance to the labor organization as such and the present division in the ranks of the labor leaders to establish proper relations with his own employees which will give them the opportunity for the discussions of their grievances, their demands and their desires with his representative and himself, in a more orderly way and in an effective manner.

The individual organization should be created for legislative purposes within the manufacturing unit and developed with a real understanding of the common incentives of individuals in their work and in their ambitions. It is fundamentally sounder than the attempt to standardize all classes of labor following the same occupations into national bodies and then arrive at a series of compromises by a trial of strength between the labor bodies so organized and the group of manufacturers involved.

No method which presupposes that the manufacturing unit must continue to be split into two opposing parts and to operate only by virtue of compromises arrived at by the leaders of the opposing elements can form a basis of a permanent solution of the problem of industrial organization.

It is for this reason that conclusions in the industrial conference at Washington, no matter what they may be, cannot be of great advantage in the situation. The leaders of labor who are engaged in this conference are obviously more concerned with maintaining the strength of their organization intact than they are with the settlement of the problem, and the leaders of industry who are involved are unable to commit any body of business men to the approval of their action. Government itself is without any power to enforce any conclusions which may be arrived at and it is questionable whether such enforcement could be made even if the conclusions were legalized.

Out of the present chaos and out of the voluminous discussion of the subject, which is constantly taking place in all kinds of publications, there should come a clearer conception of the fundamental necessities involved and therefore a better common ground of understanding upon which to base improvement. After all, however, the problem remains the problem of the individual manufacturer and his executives.

No general developments, political or economic, which may take place from the public discussions and the consequences of national bodies can protect the individual manufacturer from broken contracts, from excessive demands and from the uncertainty of present conditions. These things cannot protect the individual laborer in one particular establishment from the lack of human knowledge, from the injustice or from the unscientific organization which may prevail in that particular establishment.

The basis for all settlement must be the understanding that, inherent in all human organizations, is the necessity for operating machinery and also for legislative machinery. No matter how valuable the present organizations may be as operating bodies, they cannot function properly in production unless they provide also the legislative machinery which is necessary as a corollary to the operating organization. The full, free and complete discussion and agreement as to the rules and regulations under which work is to be performed is just as important an organized matter as is the orderly development of supervisors for the actual performance of the work.

Agreements cannot be arrived at without discussion, and discussion cannot be orderly without machinery for its orderly operation. More than ever the present situation emphasizes these necessities and should suggest to the manufacturer the importance of a study of them.

Gear Makers Adopt Standard Contract

(Continued from Page 831)

and allowable back lash were also adopted and are as follows:

Minimum length of bearing along the face is to be at least one-half the length of face when gears are held in correct alignment. The committee recommends that the gear user prove the strength of gear housings as follows: Block the driven gear shaft, then apply a lever to the shaft of the driving gear and measure the displacement of both gears when a dead load is applied through the lever. This can be done by inserting feelers or shims on the driving side of both ends of the teeth before and after load is applied.

Pitch	Back-Lash
2	0.012 in. to 0.015 in.
3	0.010 in. to 0.012 in.
4	0.008 in. to 0.010 in.
5	0.008 in. to 0.009 in.
6	0.006 in. to 0.008 in.
8	0.006 in. to 0.007 in.

A report of the Committee on Composition Gearing, which related mainly to the method of building up the blanks, was adopted, with the exception of a rule for horsepower capacity, which was rejected.

A BRITISH investigator entered Germany as soon as possible after the armistice to report to manufacturers on the prospects of competition. He reported many things, but one in particular. This was, in effect, that owing to the development of central power stations in Germany, both water and fuel, that the United Kingdom could not hope to meet Germany in manufacturing competition, other conditions being equal, as long as the coal was hauled around the country to supply power locally.

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W. I. Ralph, Vice-President E. M. Corey, Treasurer
A. B. Swetland, General Manager
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BUSINESS DEPARTMENT
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THE instructive series of articles on the German military trucks, by Lieut. Col. Arthur J. Slade, ends in this issue with a final description of the power plants of these war vehicles. Whether American manufacture can find anything of profitable interest in this construction of our enemies is a matter of argument. But no serious student of automotive engineering can fail to study these machines from a constructive standpoint. American engineers must keep abreast of the best that is being done in other countries and these German trucks must not be overlooked by the constructor who seeks to keep his product in the forefront.

Business Books

EVERY day come recruits to the ranks of the business men who believe that the preliminaries of any branch of business may be best gathered through reading of the proper sort of literature. Often these men are at a loss to know what to read or where to get the book, provided they know in a more or less precise way what they want. A book store, with a hurried inspection of the title and preface of a book, is apt to be confusing and to lead to bad selection.

A solution is offered for this problem in a pamphlet just issued by The American Library Association War Service, Washington, D. C. It is called "Five Hundred Business Books," and it is just that. The idea behind the publication is the same that prompted the issue of the pamphlet "One Thousand Technical Books" for the guidance of the War Camp Library Associations.

The new pamphlet is compiled by Ethel Cleveland, Librarian of the Business Branch of the Indianapolis Library, and in some way it carries conviction that the compiler knew the books named. There is just a line or two of description, but this brief description probably will tell you what you want to know about the book. The glowing phrases of the advertisement writer are entirely missing. Incidentally, we might add that two books by Harry Tipper, well known to Automotive Industries readers, are listed. One of these is "The New Business," published in 1915, and "Advertising, Its Principles and Practice." In the latter book Mr. Tipper co-operated with other writers.

A Suggested Remedy for Crankcase Distribution

IN certain classes of engines, such as large Diesel engines, farm lighting set engines, etc., it is customary to draw all or part of the air for the combustible charge through the engine crankcase, with the object of preventing the formation of explosive mixtures in the crankcase or of the entry of foul vapors from the crankcase into the room where the engine is operating. It occurs that this practice might prove advantageous in automobiles, as it would tend to keep the oil in the crankcase cooler and to eliminate from it some of the unconsumed fuel constituents that find their way past the pistons.

The objection may be raised that those fractions of the fuel which could not be volatilized by the heat of compression would hardly be removed by the much cooler atmospheric air passing through the crankcase. The boiling point of most of the fuel constituents passing by the piston is probably over 300 deg. Fahr. In this connection it must be remembered that not only temperature but also pressure is a factor in the evaporation of a liquid, and what counts is not so much the pressure of the atmosphere as the partial pressure of vapor of the particular liquid contained in the atmosphere. For instance, although the boiling temperature of water is 212 deg. Fahr. under normal atmospheric conditions, a pan of water set out into the open air loses constantly by evaporation. The same applies to kerosene and other liquids. Therefore, when the air required for combustion is drawn through the crankcase it will take up some of the liquids therein, particularly the more volatile liquids, such as unconsumed fuel fractions. It should thus be possible entirely to overcome the dilution of the crankcase oil, which at present gives car owners so much trouble by heavy fuel constituents.

The National Industrial Conference

By Harry Tipper

THE termination of the Industrial Conference, which was called at Washington, was not surprising to any student of any labor affairs. The composition of the Conference itself made it of doubtful value in arriving at any conclusion which could become operative, or which could be recommended for consideration to the labor organizations and the manufacturers' association.

From the moment that the Conference was organized, the group of labor representatives possessed a very great advantage in the discussion and by excellent strategy they were able to use this advantage to introduce those questions to the Conference which would strengthen their own position more effectively. The American Federation of Labor has always had a coherent policy and a definite objective in connection with its work. It has always asked for certain fundamentals at the hands of the manufacturer and the public, and it was a simple matter for the labor delegate to put this policy into a platform and bring it before the Conference.

Associations of manufacturers have always been loosely organized; they have never arrived at a definite policy upon labor, and they have had little opportunity to exchange opinions. For this reason, the manufacturers' group at Washington was unable to claim that it represented the view of the manufacturers either from the records of associations in the various industries or from any other evidence of general information.

The group representing the public could not be said to respect the public at all. Without respect to the individual capacity of the men and women appointed to this group and their national prominence in different lines of endeavor, no opportunity was presented for the consideration of the viewpoint of the mass of professional and semi-professional workers in and out of industry, who form the largest body outside of the agricultural and the skilled and unskilled worker. In any event, the method of group voting proposed and adopted immediately the Conference began, eliminated any possibility of conclusion because it was obvious that the labor leaders would feel obliged to pay more attention to consolidating their organization strength than they would to solving the problem, and it was equally clear that the employers' group would be in the same position.

A Conference composed of leading men of various sections of the population, without official designation and without any official obligation, might exert a considerable influence upon the public opinion from the character of its discussions and its determinations, but no real advance can be expected from the officials of national bodies.

Just as individual practice is always ahead of the official industrial recognition and public opinion is always ahead of political recognition, so the small group of employees and employers in individual communities in different parts of the country will solve their labor problems, or rather lay the basis for that solution, long before the general bodies are willing to admit it or see the wisdom of endorsing it.

BRITISH FORD AGENTS RESENT NEW PLAN

Application of American Plan Would Disfranchise 1,200 Distributors

LONDON, Oct. 4—(Staff Correspondence)—For some time there have been aggrieved relations between the Ford company's former agents and the new administration of Ford affairs at Manchester headquarters. Recently, with the taking up of office by Mr. Anderson, Sir Percival Perry's successor, it was decided to remodel the British Ford business on the parent lines in the United States and Canada. The new conditions briefly stated are:

That the premises must be suited and arranged to give service on Ford lines.

That the business must be exclusively in Fords and Ford spares, a full stock of which must be carried, or alternatively, where other cars are dealt in, the Ford business must be segregated as a complete department.

That no alteration should be made by the addition or removal of a standard Ford fitting or accessory to a Ford car, and there was also a readjustment of agency discounts on Ford sales.

It was felt that this policy would "disfranchise" about 800 of the Ford company's 1,200 agents in the United Kingdom, and a protest meeting of Ford agents has been held in London at which it was decided to send a deputation to Manchester, and, failing success, to send one to the Ford company at Detroit. It it stated in today's press that a deputation is about to leave for America.

Meanwhile the British management arranged to modify their earlier proposals and announced their willingness to execute such orders as are still in existence at 17½ percent discount in the case of sub-dealers and 10 percent in the case of limited dealers. It is understood that a number of deliveries have been made on the commission arrangement first announced, and in such cases, the Ford company says that it will expect the new dealer to pay the difference between 7½ percent and the 10 percent as the case may be.

So far as the unexecuted orders are concerned to the credit of the late dealers, deliveries will be made to them direct instead of through the newly appointed dealers as was at first contemplated. Steps are to be taken to see that the new dealer's estimate of cars will not be affected by such deliveries so that he may not be involved in any loss through a change of plans. The conditions on which the new proposal rests are:

1. The arrangement only applies to such orders as were secured prior to July 31 last.
2. That the orders in each case are confirmed by the retail customer by means of the retail buyers orders and agreement form now in use.
3. That the orders are executed in form of priority according to date of original orders.

The views of the meeting were that the Ford company should have given longer notice of the intended change of policy, and that they should revert to the former policy.

It should be added that the new policy obliges dealers to supply recognized traders with Ford spares from stock at a discount of 25 percent. It is understood that, on this matter, the Ford company is anxious to supplant the increasing trade in Ford imitation parts, which on the whole, are not accounted as good quality as the parent parts.

Lafayette Motors Co. Stock Sells Rapidly

INDIANAPOLIS, IND., Oct. 21—Confidence in the future of the Lafayette Motors Co., under the leadership of Charles W. Nash, was shown in the eagerness of buyers to get hold of the 40,000 shares of non-voting cumulative preferred stock. Letters from Lee, Higginson & Co., of Boston, reached prospective purchasers Oct. 6 and on Oct. 9 the issue had been subscribed with applications continuing to reach the brokers.

The capitalization is $6,000,000 with the present issue of $4,000,000 preferred and a total issue of 40,000 shares of common stock of no par value, 10,000 shares of which will be given with the preferred. In addition to Nash, such widely known men in the trade as D. McCall White and E. C. Howard, vice presidents, and James J. Storrow, chairman of the board, assure a bright future for the organization.

Equipment for the factory has been started and every effort will be made to exhibit cars at the January shows. While nothing has been given out regarding the car to be manufactured, it is said to be much lighter than the higher priced cars now on the market and built to sell in the neighborhood of $4,000.

Big Increase Shown in Wisconsin Licenses

MILWAUKEE, WIS., Oct. 20—Wisconsin has broken all previous records for motor registry this year and the total number of licenses issued so far is more than 9,500 in excess of estimates made on Jan. 1 by the Secretary of State. Up to Oct. 18, the total of passenger car licenses issued was 224,840; motor truck licenses, 7,240, and dealers' licenses, 1,390, an aggregate of 233,470. In addition, 10,675 motorcycles have been registered. An increase of more than 35,000 is indicated in passenger car registration, compared with 1918. It is believed that not less than 5,000 more cars will be licensed before the end of the year, since deliveries to dealers are increasing gradually and are considerably heavier now than during the first half of the year.

MOTOR INDUSTRIES YIELD BIG DIVIDENDS

Total of $16,401,868 Paid by Manufacturers in First 9 Months of Year

DETROIT, Oct. 18—An indication of the enormous business being done by the automotive industry in this territory is shown by the dividends declared by companies listed on the Detroit Stock Exchange for the first nine months of 1919. The total amount paid out in dividends for this period is $16,401,868, of which $14,548,055 represents passenger car and truck companies and the balance parts manufacturers. The list follows:

Automobiles Companies	
Commerce	$ 32,000
Federal	180,000
Ford-Canada	2,450,000
General Motors—common	6,918,597
General Motors—preferred	885,456
Packard—common	828,865
Packard—preferred	813,750
Paige	270,000
Reo	693,725
Studebaker—common	900,000
Studebaker—preferred	575,662
	$14,548,055

Parts Manufacturers	
Bower	$ 6,000
Continental—common	654,207
Continental—preferred	178,176
Edmunds—common	40,000
Edmunds—preferred	64,120
General Aluminum	70,810
Hall Lamps	112,500
Michigan Stamping	630,500
Michigan Drop Forge	22,500
Prudden	75,000
	$ 1,853,813
Total	$16,401,868

FORD RENEWAL RATES LOWER

NEW YORK, Oct. 17—The Ford Motor Co. has renewed for three months $50,000,000 of an outstanding issue of $60,000,000 of notes on a straight 5¼ per cent discount basis. The remaining $10,000,000 was paid off in cash. The notes were originally sold last July to a syndicate of banks at 5½ per cent in accordance with the prevailing rate. Announcement of the renewal at a substantial reduction from the interest rate of last July, coming at a time when call money had been abnormally high, caused considerable comment in Wall Street.

ACME MOTOR ADDING TO PLANT

CADILLAC, MICH., Oct. 18—Construction of the first of four units made necessary by increasing business of the Acme Motor Truck Co. is under way. The first unit will be 65x144 ft. and with the three other units will double the capacity of the plant. The body-building department also is expanding, and for some time orders have been far in excess of production. The new units are to be of pressed brick uniform in appearance with the other Acme construction.

DUESENBERG RACERS SET SPEED RECORDS

New Small Engine Gives Remarkable Performance in Trials

SHEEPSHEAD BAY, NEW YORK, Nov. 10—In three non-competitive speed trials under A. A. A. observation held here today, Duesenberg eight-cylinder cars established new class figures, one of which is expected to become an official record.

Milton with a 300 cu. in. piston displacement engine (3x5¼ in.) shattered all figures in the A. A. A. Class C, 231-300 cu. in. division from 1 to 25 miles, including De Palma's record made on this track in a Packard Special. Milton's time for the 25 mile course was 12 min. 55.74 sec. Several times during the trial Milton approached a speed of two miles a minute, his time between the fourth and fifth miles being 2:02.37-2:32.78.

Lewis, driving a Duesenberg car with 450 cu. in. displacement, established a new figure for the 25-mile course, and O'Donnell, testing for the first time the new Duesenberg 183 cu. in. displacement car, especially designed to conform with the new A. A. A. specifications for 1920 racing, set entirely new records from 1 to 140 miles, including the one-hour mark.

This new small car is the smallest racing machine ever made by Duesenberg. With a piston displacement slightly larger than the Ford and smaller than the Dodge or Maxwell, this car showed remarkable speed, and while it was capable of traveling well over 100 m.p.h., it was not pushed owing to the fact that no marks had to be beaten.

The new Duesenberg eights have their cylinders all in a row, and use overhead valves operated by an overhead camshaft driven by bevel gearing through a shaft driven from the forward end of the crankshaft. The smallest engine has a bore and stroke of 2½x4⅝ in. and the largest car 3-1/32x5¼ in. All engines are fitted with two Miller carbureters, one for each four cylinders. The ignition was by Exide battery and Delco timer-distributor to Bethlehem spark plugs, but in the smaller car to AC spark plugs. Sinclair gasoline and Opaline oil were used. The following is a complete list of equipment: Rudge-Whitworth wire wheels, SKF bearings, Magnalite pistons, Motometer, J-M tachometer, Parish frame, Goodyear tires, Powrlock differential, Fahrig metal bearings, Ajax radiators, Tuthill springs and McQuay Norris piston rings.

The A. A. A. official time in each of the trials follows:

Class C. Non-Competitive Time Trials, 161-183 cu. in. piston displacement.

Distance	Car	Driver	Time
1	Duesenberg	O'Donnell	40.42
2	Duesenberg	O'Donnell	1:20.32
3	Duesenberg	O'Donnell	2:00.46
4	Duesenberg	O'Donnell	2:39.33
5	Duesenberg	O'Donnell	3:16.58
10	Duesenberg	O'Donnell	6:20.80
15	Duesenberg	O'Donnell	9:24.26
20	Duesenberg	O'Donnell	12:28.62
25	Duesenberg	O'Donnell	15:34.34
30	Duesenberg	O'Donnell	18:41.24
40	Duesenberg	O'Donnell	25:00.10
50	Duesenberg	O'Donnell	33:40.33
775	Duesenberg	O'Donnell	49:04.39
100	Duesenberg	O'Donnell	1:05:03.10
125	Duesenberg	O'Donnell	1:20:28.80

231-300 cu. in. piston displacement.

Distance	Car	Driver	Time
1	Duesenberg	Milton	30.78
2	Duesenberg	Milton	1:01.40
3	Duesenberg	Milton	1:31.93
4	Duesenberg	Milton	2:02.37
5	Duesenberg	Milton	2:32.78
10	Duesenberg	Milton	5:04.78
15	Duesenberg	Milton	7:39.58
20	Duesenberg	Milton	10:14.18
25	Duesenberg	Milton	12:55.74

301-450 cu. in. piston displacement.

Distance	Car	Driver	Time
1	Duesenberg	Lewis	32.49
2	Duesenberg	Lewis	1:04.66
3	Duesenberg	Lewis	1:37.11
4	Duesenberg	Lewis	2:09.46
5	Duesenberg	Lewis	2:42.23
10	Duesenberg	Lewis	5:24.91
15	Duesenberg	Lewis	8:07.52
20	Duesenberg	Lewis	10:49.32
25	Duesenberg	Lewis	13:31.63

1 Hour Time Trial.

Class C. Non-Competitive, 161-183 cu. in piston displacement: 1 hour, 92 miles. O'Donnell, Duesenberg. Nov. 10, 1919.

Publication of this issue of Automotive Industries has been delayed until Nov. 22 by conditions over which the publishers have had no control. Further issues will be forthcoming as rapidly as they can be printed.

Canadian General Motors Organized

DETROIT, Oct. 18—General Motors, Ltd., organized with a capital of $200,000, will locate at Regina, Sask., where it is the intention to centralize the automotive equipment industry of Western Canada, in charge of a staff of experts. A. B. Cook, former president of the Saskatchewan Motor Co., heads the new organization and A. J. Gibson, former manager of the Motor Sales Corp., Ltd., of Regina, is managing director. Announcement of the plans of the organization was made in Detroit this week.

WOLVERINE TUBE SOLD

DETROIT, MICH., Oct. 18—The Motor Truck Body Co. has been purchased by the Wolverine Tube Co. The consideration is not disclosed but it is said to be approximately $125,000. The property consists of 2½ acres having a frontage of 365 ft. on the Wabash railroad. There are two brick buildings containing 30,000 sq. ft. of floor space. The Wolverine company has outgrown its present facilities and has been looking around for additional manufacturing units for some time.

CHINA HELPED TO BUY PLANES

WASHINGTON, Oct. 18—The Vickers Co., British airplane manufacturer, has arranged to loan the Chinese Government $45,000,000 at 8 per cent to be used to purchase airplanes, hangars and parts from that company, according to cable advice just received here.

FORD STREET CAR SATISFIES TESTS

Double Opposed Type Engine Combines All Necessary Operations in Light Unit

DETROIT, Oct. 20—Henry Ford's internal combustion engine for his gasoline street car, with which he expects to revolutionize the transportation system, has been completed and given a successful tryout at the plant at Dearborn. Plans for sending the first gasoline propelled street car in a race against the Wolverine, over the Michigan Central tracks from Detroit to Chicago, practically have been completed.

While the engine was humming through the block test, Ford reiterated his offer to turn the invention over to the city as a solution of the transportation problem. Ford and his general manager, Charles E. Sorensen, highly pleased with the successful test, wore an "I-told-you-so" expression in discussing the invention.

Ford expressed himself as convinced that he had solved the problem of cheaper and faster transportation. The engine is of the double opposed type and generates its own electricity for ignition and lighting. Opposing pistons are linked to the same throw and new designs of linked rod are used. All operations necessary for the control of the car are centered in the engine. This is accomplished with a 75 per cent reduction in weight as compared with the power and control equipment of the electrically propelled street car.

"The power unit which moves the car represents a new combination of functions," said Sorensen. "It is an engine, an air compressor, an electrical generator and a heating and lighting plant, all in one. The power that moves the car also compresses the air for the brakes and generates the electric current for the lighting and signal system, while a sirocco fan, bolted to the front end of the starter, draws air in through the housing of the engine, where it is heated and then exhausted through heating pipes to warm the car. Another feature will be the front and rear drive, the power being transmitted by light, flexible shafts to both front and rear trucks.

The power plant of the car weighs about 1,150 lbs. The entire car will weigh about seven tons as compared with the 12 and 14 ton electric cars. It will be 37 ft. over all, develop 90 h. p., and will seat 42 passengers. It can make 70 m. p. h., and can be geared to a rate of speed conforming to the regulations of the city or state.

Engines for five cars are on the way at the Ford experimental shops. The first will be of the private-car type for long distance demonstrations and invitations already have been received from various municipalities for demonstration. The car will take a 3 per cent grade at a rate of 20 miles an hour on high and is equipped with air and foot brakes.

PARIS-NICE TRIP MADE IN ONE DAY BY DELAGE

New Six-Cylinder Car Now in Production—75 to Be Shipped

PARIS, Sept. 20—(Staff Correspondence)—Driving his new six-cylinder car, Louis Delage has established a record by traveling from Paris to Nice in one day. Leaving the gates of Paris at 5:40 a. m., Nice was entered at 9:35 p. m., the 621 miles thus having been covered in 15 hrs. 55 min. Stops on the road for gasoline, food, grade crossings, etc., totaled 58 min. No account was taken of stops of less than one minute's duration. The net running time was 14 hrs. 57 min., giving an average speed for the entire distance of 41:53 min.

High speed was maintained during the first seven hours, the distance covered in each sixty minutes, ignoring all stops, being 44:7, 44:7, 45:3, 44:3, 43:1, 42:3 and 40 miles. The greatest distance covered in any one hour was 49:7, which was attained on the banks of the Rhone, between Valence and Orange. The trip was made under ordinary road conditions, without any advance preparations, and included two hours' night driving in the mountains. The road surfaces were poor to bad throughout. The performance was controlled and timed by W. F. Bradley, European representative of Automotive Industries.

The six-cylinder Delage is the post-war model, having cylinders of 80 by 150 mm. bore and stroke. One of the features of the car is the use of front wheel brakes. A standard touring model, with full equipment, including two spare wheels and two spare tires, was used for this demonstration. Enough gasoline was carried for the entire trip, this being equivalent, at the outset, to four extra passengers.

The six-cylinder Delage is now in regular production.

Cuban Firm Planning Havana-Miami Air Route

NEW YORK, Oct. 21—Newspaper announcements here today stated that plans were being perfected for the establishment of an aerial passenger line between Havana, Cuba, and Miami, Fla., and from thence to New York. A saving in time for the full trip of 48 hr. was claimed to be possible by the Havana promoters. Six three-passenger machines and two of sixteen-passenger capacity were to be used, it was announced. Hanibal J. Mesa, a wealthy Cuban, was named as financier of the project.

Nelson Car Makers Absorb Gray Motors

DETROIT, Oct. 18—The E. A. Nelson Motor Car Co. and the Gray Motor Co., have consolidated and will manufacture the present Nelson car on a greatly enlarged scale. The Nelson company was organized in 1917 while the Gray Co. has been in business since 1905. The new concern will be known as the Nelson Motor Car Co.

The capital stock of the company has been increased to $2,000,000 and shortly will be increased again to $3,000,000, of which $1,000,000 will be 8 per cent preferred and $2,000,000 common. This second increase will provide funds for the amalgamation.

Officers of the Gray Motor Car Co., headed by D. J. Mulford, the president, will retire. The new company will be managed by the present Nelson personnel, which includes E. A. Nelson, president; C. H. Dunlap, vice-president; C. F. Harvey, treasurer; G. C. Aldrich, secretary. For the present both plants will be operated but in course of time, the Nelson equipment will be moved into the Gray plant and future work carried on there.

Templar Motors Plans 10,000 Cars in 1920

CLEVELAND, O., Oct. 20—The Templar Motors Corp., Cleveland's youngest member of the family of automobile manufactories, is the latest organization of the kind to be forced to enlarge its plant.

M. F. Branley, president of the corporation, has announced that the factory on Halstead Avenue, Lakewood, will be expanded to provide for the production of 10,000 cars next year.

The cost of the new buildings, five in number, will approximate $700,000, while the finishing and equipment will add an additional $300,000 to the cost.

Canadian Ford Plant Shows Large Profits

DETROIT, Oct. 18—Profits equivalent to 43.3 per cent on the $7,000,000 of outstanding stock of the Ford Motor Co., of Canada, after allowance for business profits tax, are shown in the report of the company for the fiscal year, ending July 31. The company's balance sheet shows current assets of $16,185,291 as against $14,281,809 for the previous year. The assets consist of cash on hand or in banks $3,048,444 against $580,976 a year ago, accounts $2,823,988 against $2,016,663 a year ago, and inventories $5,221,440 compared with $6,978,010. Current liabilities consist of accounts payable and accrued payroll of $1,548,065 compared with $1,919,284.

Combining the year's profits of $3,031,903 with the surplus of $4,338,098 carried forward from the preceding year, there was a surplus July 31 of $5,270,061 after appropriating $2,100,000 for dividend payments.

SWISS MAGNETO TO MOVE

TOLEDO, Oct. 21—The American Swiss Magneto Co., capitalized at $100,000, will move its plant from Monroe, Mich., to Toledo for the manufacture of magnetos for the automotive industry. J. B. Nordholdt, W. W. Knight, H. L. Thompson are the incorporators and J. A. Bohannon manager of the plant.

ITALY IMPOSES HEAVY IMPORT PROFIT TAX

Limited Liability Type of Incorporation There Recommended to Firms Here

WASHINGTON, Oct. 18—Inasmuch as American automobile manufacturers have, in some instances, arranged for the assembling or maintenance of American cars in factories in Italy, information regarding the legal status of branch houses and agencies in that country published by the Department of Commerce is of particular interest.

A foreign concern may transact business in Italy either through an agency or a branch office, but a certificate of incorporation of the foreign concern, its by-laws, powers of attorney vested in the manager of the branch, and a declaration as to the amount of capital destined for operations in Italy, must be filed at the chancery office of the tribunal located where the central agency or branch office is opened. The law also required a certified copy of the yearly balance sheet of the parent concern to be filed at the chancery, the reason for this being that third parties dealing with a firm in Italy may be able to ascertain the standing of the concern. A registration fee of 2 lire per mille is payable on the amount of capital declared as destined for Italian operations, following payment of which the agency or branch office is lawfully registered.

The agency or branch office is liable to an ordinary income tax and an extra war-profit tax in addition to municipal and chamber of commerce taxes. An ordinary income tax of about 17 per cent is levied on the yearly profits of the agency. If the profits do not exceed 8 per cent in respect of the capital employed in Italy, they are subject only to the ordinary income tax, but, if they have exceeded this amount, an extra war-profit tax is imposed on a progressive scale to a maximum of 60 per cent on the profits.

All employees whose salaries exceed $154 a year pay income taxes, but the firm is liable for payment with the right of obtaining reimbursement from employees. The municipal tax is not reckoned on the profits, but varies according to the importance of the concern and is limited to a maximum of $386 a year. A fixed tax not exceeding $193 a year is levied by the local chamber of commerce.

Incorporation in Italy under the type of the Societa Anonima is recommended for any business of considerable volume. This type is a limited liability concern. The liability of the members is limited to the value of their shares in the company and is similar to the American and English joint stock companies.

INCREASES CAPITAL STOCK

DOVER, DEL., Oct. 21—The South Bend Motors Co., Chicago, has made application to increase its stock from $500,000 to $6,000,000.

DEALERS ASK HIGHER TRACTOR COMMISSION

National Implement Retailers Request More Liberal Discounts

CHICAGO, Oct. 18—Higher commissions on the sale of tractors were asked for in opinions expressed here by delegates from the National Federation of Retail Implement Dealers' Association. The organization recently held here its annual conference with the Sales Managers' Division of the National Implement & Vehicle Association, prior to the annual convention of the latter association, the full membership of which is meeting this week.

The request of the federation was linked with a declaration that unlimited free service is an established institution in the implement business and that commissions must be such that this free service may be continued. Statements were made that it would be impossible to retain the loyalty of the farmers if this service should be changed in any way.

The federation represents about 16,000 dealers and their declarations may be accepted as the majority opinion of the implement trade. However, both the sales managers' division and the association as a whole evidenced little inclination to come to an agreement over the point at issue.

A survey of the industry recently showed that distributers were averaging discounts of from 23.06 to 26.25 per cent and that dealers were receiving from 14.95 to 18.83 per cent. The dealers here presented the claim that their portion was too small and that greater returns were necessary.

H. M. Wallis, of the J. I. Case Plow Works Co., was elected president of the N. I. V. A.

Air Traffic Between Florida and Bahamas

WASHINGTON, Oct. 20—An English aviation company known as the Bahamas and West Atlantic Avro Co., Ltd., has been incorporated recently under the laws of the Bahamas. The company plans to establish commercial and passenger flying between Nassau and Miami, Fla., and ultimately to extend the journey to other West Indian islands. It is expected that the regular service between Florida and the Bahamas will be established in January, 1920, according to announcement made by the Latin-American Division of the Bureau of Foreign and Domestic Commerce.

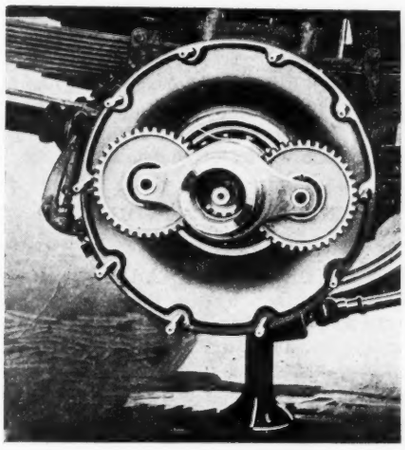
STEWART WARNER DOUBLES PROFITS

CHICAGO, Oct. 21—The Stewart Warner Speedometer Corp., for the quarter ended Sept. 30 reports profits before Federal taxes of $1,224,857, as compared with $638,846 in the same period of 1918. The profits for nine months aggregate $2,598,740, against $1,583,146 for the same period in the preceding year. The company has declared a regular quarterly dividend of 3 per cent on the common stock, payable Nov. 15 to stock of record Oct. 30, increasing the annual rate from 8 per cent to 12 per cent. The common stock has been increased from 100,000 shares of $100 par value to 400,000 shares of no par value.

Walker Electric Truck Axle to Be Marketed

CHICAGO, Oct. 20—The special internal gear drive truck axle used on the Walker Electric for the past ten years henceforth will be manufactured for the general market by the Edwards Valve & Mfg. Co., of this city, and will be offered in sizes up to ten tons.

In this axle the gears are enclosed in oil tight compartments, so that all bearings and gears run completely immersed in oil. As the greater part of the reduction is made beyond the differential, the differential action when pulling through sand or on slippery streets is minimized.



The Walker Axle

Power is received in the usual way by the bevel drive pinion and gear mounted with the differential assembly. The power is transmitted by means of drive shafts, through the center of the load carrying member, to the pinions located in the center of the wheels. These pinions float between and drive two idler gears each, which in turn drive an internal gear, in the wheel, encircling all and keyed to the wheel itself.

The idler gears are placed 180 deg. apart with their line of centers parallel to the ground. They run on substantial roller bearings mounted between two arms which project from the yoke.

GERMANS BUY OWN TRUCKS

NEW YORK, Oct. 21—A syndicate of German automobile dealers has purchased 1,200 motor trucks abandoned by the German army in the area taken over by the Americans as part of the armistice material. This information was contained in newspaper dispatches recently published here.

CHICAGO WILL HAVE AIRCRAFT EXPOSITION

Airtrucks, Limousines and Sport Cars to Be Features in Show

NEW YORK, Oct. 20—The first aeronautical exposition next year will be held in Chicago, the week of Jan. 8, and, it is said, will be the first show of its kind ever to be held outside of New York. Exhibitors are preparing to display a variety of 1920 airplanes, the designers of which have anticipated the wants of prospective customers among the rapidly increasing number of private owners, the Manufacturers' Aircraft Association announced here recently. The evolution of the airplane from war to peacetime models will be one of the features.

The executive committee in charge of the show has established headquarters at the Congress Hotel, Chicago.

Not only will the next year model passenger airplane differ in design from the wartime craft, but there are a number of hidden improvements, all calculated to provide more comfort for the aerial passenger. Enclosed cabins, observation platforms, and comfortable chairs in the aerial Pullmans await the public.

Seaplanes privately owned, passenger machines and long distant aircraft are gradually approaching the goal of recognition. Once the public learns that it can ride through space swiftly and at reasonable cost and safety, it will discard slower means of travel.

The sport plane probably will be the first vehicle adopted by private owners and driven by them. It was the sport-loving men and women who first used automobiles, motorboats and, yes, back in another generation, the railroad. We may expect, therefore, a parallel reception for the airplane. This last year has afforded designers an oportunity to consider the comfort and general convenience of passengers both in speed, safety and cost. The men who make aircraft have also considered it as a cargo carrier of the future, and have devoted much time to planes intended for that use.

Last year and the year before, which, by the way, includes just about the total age of our aeronautical development, machines were made for military purposes alone. Where speed was sacrificed, it was to make room for armament. Where there was great speed, there was little or no accommodation for cargo.

Then again, many commercial experiments have been made with the airplane during recent months and it has demonstrated its superiority over other vehicles. Chicago in the future will take her place as one of the important aerial centers of the country, just as she has done in railroad and automobile traffic. When aeronautics is placed on a systematized basis and the entire country is working with the Government toward its development, then people will have an opportunity to realize the future dominion of the flying machine.

SEPTEMBER RUBBER IMPORTS LARGER

Plantation Product Shows Big Margin Over Para Gums in Market

NEW YORK, Oct. 21—Imports of crude rubber for September are far ahead of the total for the same month of 1918. Why this should be is not clear, as, despite shipping shortage and the perils of undersea warfare, the latter months of 1918 were about normal. Importation of rubber has been steady throughout the present year and September shows a slight gain when compared with the figures for the same month in 1917.

A brief analysis of last month's figures serves to illustrate the extent of the swing from Para and other wild rubbers to the plantation product. A few years back we were practically dependent on the crop of wild rubber as the newly-formed plantations had not commenced to produce in quantity.

ANALYSIS OF SOURCES OF SUPPLY SEPTEMBER, 1919

	Tons
Plantation	10,143
Para	3,243
African	312
Mexican and Central American	62
Montevideo and Santos	96
	14,036

Excepting the first item, all are wild rubbers. Plantation rubber is, broadly speaking, a cultivated variety of the Hevea Braziliensis of the Para district. Early attempts at acclimating the seed in the Far East were not altogether successful, but during the last few years much progress has been made and now the bulk of our supply comes from this source.

Official figures compiled by the Rubber Association of America give comparative import totals for the past three years as follows:

	1919 Tons	1918 Tons	1917 Tons
January	7,235	16,084	12,788
February	14,079	13,108	10,162
March	28,233	17,161	18,624
April	27,948	13,425	13,000
May	16,348	16,288	18,411
June	16,319	24,124	15,096
August	11,067	10,421	17,290
July	17,965	16,092	17,290
September	14,036	5,323	13,664

NEW PARTS COMPANY FORMED

NEW YORK, Oct. 22—The Rubes Auto Accessories Mfg. Co. of Manhattan, manufacturing automobile parts, electric dynamos, etc., has been capitalized at $100,000 by W. G. McIvor, D. A. Posner, 233 Broadway, and C. Cobb, Cedarhurst.

Air Service to Sell . Many Tons of Metals

WASHINGTON, Oct. 18—Large quantities of metals are for sale by the Material Disposal Division of the Air Service. Included are thousands of pounds of seamless brass tubing, several hundred thousand pounds of chrome nickel steel bars, aluminum ingots, chrome vanadium steel bars, chrome nickel steel bars, bronze bars and hundreds of pounds of copper tubing.

Complete information as to quantities, location, dates of sale, etc., can be secured from the Material Disposal Division of any District Bureau of Aircraft Production at Boston, Buffalo, Chicago, Dayton, Detroit, New York or San Francisco.

Chandler Profits Pass Million a Month Mark

NEW YORK, Oct. 22—Operating profits of the Chandler Motor Car Co., Cleveland, O., are exceeding $1,000,000 a month, according to reports recently issued here.

The upward swing in earnings is said to be due to the increased production, the company recently shipping more than 700 cars in one week. It is expected that the enlarged earnings will result in an increase in the $8 rate now established on the new stock, early in 1920.

In September and October, profits were equal to the total profits of $2,194,000 in all of 1918 and about 66 per cent of the profits for the first eight months of this year, which were $3,189,000.

Belgium Lifts Ban on Automotive Imports

NEW YORK, Oct. 21—Additional steps have been taken by the Belgian government to free trade in that country, according to cable advices here, the principal one being the abolition of the rule requiring certificates of origin for certain articles of import. Chief among them was automobiles, the movement of which into Belgium is now thought to be without restrictions. This announcement was coincident with one lifting restrictions on importations for Germany.

Auto Body's Stock Up 3300 Per Cent in 8 Years

DETROIT, Oct. 22—Listing of the preferred stock of the Auto Body Co. of Lansing on the local stock exchange disclosed the fact that each $1,000 of original stock had increased to $33,000 par value. The company started in 1901 with a capital of $12,000 and now has a well-equipped plant with a floor space of 11 acres. The original stockholders have received $8 for every dollar invested despite the fact that the company made no money in 1917 or 1918. The company has no bonded debt and has resources in excess of $2,400,000. Common stock to the amount of $1,009,000 and preferred $480,900 have been issued.

FORM AMERICAN CHAMBER OF COMMERCE IN SAO PAULO

WASHINGTON, Oct. 20—An American Chamber of Commerce was recently formed at Sao Paulo, Brazil. Forty guests, representatives of North American business firms having offices in the city, were present at the inaugural dinner, when the by-laws were adopted.

NAME DATES FOR THE TRACTOR SHOW

Development of Industry to Be Shown in Exhibition Feb. 9, 1920

KANSAS CITY, MO., Oct. 20—Officials of the Kansas City Tractor Club have announced that the fifth annual National Tractor Show will be held in Kansas City the week of Feb. 9, 1920. The show promises to be the largest ever held, even surpassing last year's, which was regarded as one of the best ever held in the United States.

The tractor industry seems to have reached a stage of development where a great indoor exhibition held in mid-winter has a stronger appeal than outdoor demonstrations. It is believed that progressive farmers are already "sold" on the tractor itself and that demonstrations are now scarcely needed to show them what dependable tractors will do in the field. The tractor situation has resolved itself into a question of showing farmers the various makes and models so they might judge for themselves which model is the best adapted for their particular work.

It is expected that the Kansas City Show, coming at a time when most farm work is at a standstill and the farmers are at leisure, will attract a large attendance from farmers. The show will be housed in a large, well-heated and well-ventilated building in which prospective users and prospective dealers will have ample opportunity to look over the various models at their leisure.

The record of the last four tractor shows has proved that the indoor events are popular. Each year has seen a big increase in attendance and it is said that there were more than ten times more paid admissions last year than for the first show four years before.

PACKARD PROFIT LESS

NEW YORK, Oct. 22—Net profits of the Packard Motor Car Co., after taxes, for the year ending Aug. 31, 1919, were $5,433,634, a decrease of $183,073 under the previous year. The dividend disbursements, however, were $2,099,244, and showed an increase of $828,856 over the previous year's distribution. A decline in surplus of $1,011,929 was reported. The present surplus is $3,334,399.

LABOR TROUBLES SETTLED

RACINE, WIS., Oct. 20—The Webster Mfg. Co. of Racine, Wis., magnetos and ignition specialties, is back at normal production after a serious interruption caused by labor troubles extending over a period of several months. All departments are running with full forces. The strike was based on a demand for recognition of the union, and while the terms of the agreement are not given out, it is stated that the concession was not granted, although there will be some increases in wages.

BELGIUM TO BUY MACHINE TOOLS

Government Will Appropriate 25,000,000 *Francs and Arrange Credit of* $50,000,000

WASHINGTON, Oct. 18.—The War Department has arranged a contract with La Construction Metallique, a co-operative society of 500 Belgian manufacturers, for the sale of surplus machine tools. The Belgian Government is arranging a credit for $50,000,000 in this country, and will appropriate 25,000,000 francs to make purchases of the machine tools. To date 2,500 tools have been purchased from the War Department by this Belgian organization.

Mail Non-Stop Flight From Cleveland to Jersey

WASHINGTON, Oct. 18—The aerial mail service of the Post Office Department yesterday made a non-stop flight in a rebuilt DeHaviland four plane equipped with a Liberty engine, carrying the mail from Cleveland to Jersey City, a distance of 415 miles, with an alcohol fuel. The distance was covered in 3 hr. and 26 min., the rate of speed being 129 m.p.h.

The purpose of the test was to determine how much more mileage it was possible to get out of alcohol as compared with high-test gasoline. The results obtained are in keeping with the two months' flying on this synthetic fuel between New York and Washington.

This was the longest non-stop flight ever made with a mail plane.

THREE CAR SHOWS IN 1920

PITTSFIELD, MASS., Oct. 20—Three automobile shows to be held early in 1920 were announced today by James J. Callahan, the promoter. They are: Amsterdam, N. Y., week of Jan. 26, benefit of Co. H, State Armory; Greenfield, Mass., week of Feb. 9, benefit of Co. A, State Armory, and Pittsfield, Mass., week of Feb. 23, benefit of Co. F, State Armory.

New Lincoln Car to Appear in January

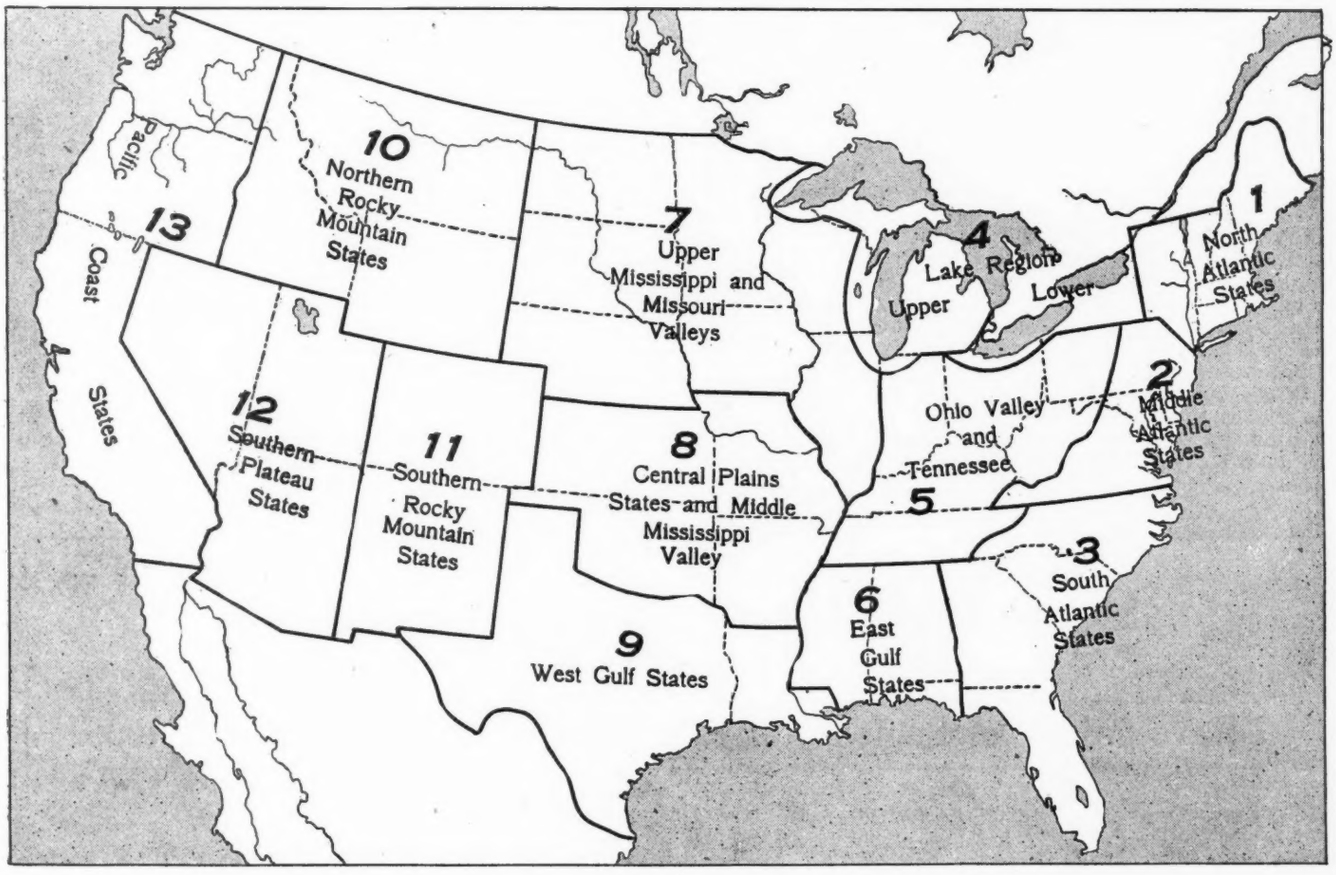
DETROIT, Oct. 18—It is now stated that the Lincoln Motor Co. will formally announce the new car which it proposes to manufacture about the middle of December. The company has practically completed its organization and is ready to go ahead. This car was to be announced in September but at the last minute minor changes caused the announcement to be delayed.

Dealers are confident that the new Lincoln car will be exhibited at the national automobile shows in January. The big plant is now in operation and no visitors are permitted in the mechanical department.

TOLEDO TO DETROIT BY TRUCK

TOLEDO, O., Oct. 21—A ship-by-truck line from Toledo to Detroit will begin operations Nov. 1, a fleet from the Standard Motor Truck Co., having been purchased by W. F. Bowman and C. A. Miller for use in the freight service. It is planned to expand greatly.

Inaugurate Daily Weather Forecast for Flyers


Pacific Coast States
13
10 Northern Rocky Mountain States
7 Upper Mississippi and Missouri Valleys
4 Lake Region Upper Lower
1 North Atlantic States
2 Middle Atlantic States
Ohio Valley and Tennessee
5
12 Southern Plateau States
11 Southern Rocky Mountain States
8 Central Plains States and Middle Mississippi Valley
3 South Atlantic States
6 East Gulf States
9 West Gulf States

Washington, Oct. 20.—A daily weather forecast for fliers has been inaugurated by the Weather Bureau of the United States Department of Agriculture. The country has been divided into thirteen zones and the forecasts are sent out for each zone to the various army posts, airdromes and publications interested. Forecasts are made at 9:30 a. m. and 9:30 p. m., and cover a period of twenty-four hours. They indicate whether the flying weather will be "poor" or "good," whether there is a prospect of rains or clouds and the strength and direction of the winds. In addition they estimate the strength of the winds at various altitudes and inform the fliers whether they will find moderate winds at 1,500 feet, for example, or strong winds at 3,000 or 4,000 feet

NEW RAILROAD TRUCK WORKS WELL IN TESTS

F W D Company Plans Quantity Production of Flange-Wheel Motor Vehicle

CLINTONVILLE, WIS., Oct. 20—The Four Wheel Drive Auto Co. of Clintonville, Wis., manufacturer of the F W D truck, is testing out a new type of motor vehicle designed for use on railroad tracks. The new design so far has exceeded expectations as to performance and utility and is attracting wide attention among railroad officials.

The experimental car is a standard 3½-ton F W D chassis, with flanged wheels, carrying a 24-passenger body, and having regulation automatic couplers at front and rear. On a trial run on the Chicago & Northwestern between Clintonville and Shawano, Wis., the F W D railroad car made a distance of 4.75 miles on a consumption of one gallon of gasoline. The average speed was 29.5 m.p.h. The F W D company is planning a quantity production of the new car for equipment of the smaller railroads particularly and special use on large lines.

Implement Dealers in Trade Protest

CHICAGO, Oct. 17—The question has come up again as to whether the tractor and its equipment should be sold by the old-line implement dealer or by the automotive dealer. This recurrence of the continually mooted problem cropped up, as might be expected, in the sessions held here in connection with the annual convention of the National Implement & Vehicle Association.

It first came to light last week when the National Federation of Retail Implement Dealers' Associations met with the Sales Managers' Division of the implement and vehicle association. The Michigan delegation filed a formal protest against implement manufacturers making special lines of tractor machinery and selling them to any dealer taking the agency for a particular tractor whether or not he happened to be an implement dealer.

This situation is one which came into the trade with the appearance of the Fordson tractor. Several old line implement concerns are building specially designed lines of equipment for sale with the Fordson and, as the distribution of the Fordson is almost exclusively automotive, hundreds of automobile dealers thus have been put into the retail implement business within the last eighteen months.

Within the same period, several other tractor concerns have adopted practically the same plan, selling their tractors and equipment lines as a unit. As all of the manufacturers of these tractors make contracts with automobile dealers where the latter seems to be the man best qualified for an agency, the implement trade finds itself up against a new and aggressive competition which it does not know how to meet successfully.

A WARNING

REPRESENTING himself as a subscription solicitor for automobile trade publications of the group of the Class Journal Co., a man giving the name of H. H. Goode has been collecting money without authority in Southwestern and Western cities. He was last reported on the Pacific Coast, where the police are on the lookout for him.

The man is not authorized to collect money for subscriptions to Automotive Industries, Motor World, Motor Age, the Commercial Vehicle, Motor Boat or the Tire Rate Book. There is no such corporation as the "Periodical Publishers' Service Co., 74 Broadway, New York," which he claims to represent.

Goode has been representing himself as an ex-service man. One of his so called "receipts" is shown in the accompanying cut.

Marlin-Rockwell Plants Are Combined

NEW YORK, Oct. 22—The Standard Roller Bearing Co., and all the Marlin-Rockwell properties have been combined into a new operating organization to be known as the Standard Steel and Bearings, Inc., according to a recent announcement.

The constituent plants are: Standard Roller Bearing Co., Philadelphia, Braeburn Steel Co., Pittsburgh; Rockwell Drake Bearings Division, Plainville, Conn.; Willow Street and Hamden Divisions, New Haven, Conn.; and the Norwich Division, Norwich, Conn. The Marlin-Rockwell manufactures to be centralized in the new company are: Standard Roller Bearing annular ball bearings, single and double, Standard Roller Bearing taper roller bearings, Standard Roller Bearing steel balls and the Braeburn steel electric furnace, high speed and crucible tool steels.

It is announced that no changes are implied either as to policy or executive and operating personnel. The general sales and accounting departments are to be combined in the executive offices, 347 Madison Avenue, New York.

SAXON TO REORGANIZE

DETROIT, Oct. 17—A reorganization plan, authorizing 200,000 shares of common stock without par value and $1,500,000 of 8 per cent cumulative preferred stock, will be presented to the Saxon Motor Car Corp. stockholders at a meeting on Nov. 5.

The proposed reorganization, which has the approval of the committee of creditors, will result in $1,250,000 of the new preferred stock being issued to creditors to pay off a like amount of liabilities now outstanding, leaving the company without debts except the current obligations incidental to operations.

Holders of the present 60,000 shares of $100 par capital stock, it is proposed, will exchange their stock for new common on a share for share basis.

Periodical Publishers' Service Co.

74 BROADWAY, NEW YORK

I Have Paid Your Representative $ 3.00 One Year's Subscription

Mag. Motor World

Name Roy J Anderson

Address 8 E 7th St

By H H Goode

P. O. Eugene State Ore

This illustration shows one of the spurious receipts given for subscriptions to Motor World by a man claiming to represent the Class Journal Company.

MAKERS NOT AFFECTED BY DETROIT EMBARGO

Daily Report on Cars Loaded and Unloaded to Be Made by Industries

DETROIT, Oct. 22—Automobile manufacturers and dealers are vastly relieved to learn that the threatened embargo on inbound freight will in no way effect the industry. Announcement, quieting the fears of the trade, was made this week by W. D. Trump, terminal manager for the United States Railroad Administration for the Detroit district, and reflects credit on the industry generally.

Trump's statement was to the effect that the automobile manufacturers and dealers were in no way responsible for the congested conditions and that they had made efforts in every instance to unload cars as quickly as possible in order to get the empties loaded and out of the local yards. Even in the event of a rigid embargo order, Trump said, the permit system would be invoked. This would allow manufacturers and shippers who make it a rule to move their freight as quickly as it arrives, to have all the equipment necessary for handling products needed.

The congestion, which is said to be critical, is due, in great measure, according to railway officials, to wild-cat lumber dealers and speculators, and carelessness on the part of small shippers. The threatened coal strike, too, is having its effect in an order to regional directors to rush all open top cars to the coal mines in order that every pound of coal may be distributed in anticipation of the threatened walkout.

Complaint of lack of labor to get cars unloaded was made at a meeting at the Board of Commerce and so critical was the situation declared to be that mass-meetings of employes in large industries were suggested in the hope of getting volunteers from among the skilled labor to help in unloading cars and relieving the congestion.

Arthur T. Waterfall, traffic director of Dodge Bros., made a suggestion, which met instant favor, that the situation be relieved through the chief executive of every industry requiring a complete report of all cars received and unloaded each morning. Trump has asked Washington to delay the embargo order on the assurance of manufacturers and shippers that they will co-operate in every way to relieve the situation and there is hope that the conditions which existed under the embargo of 1916 will not find repetition.

Already a general embargo has been placed on all less than car-lot shipments into Detroit as a result of the congestion in the warehouses of all railroads and the failure of receivers to remove their goods promptly. Even under the permit system, in the event of a general embargo, much time would be lost in securing cars for delivery of goods necessary to the uninterrupted operation of the industries in Detroit.

Building activities, involving the expenditure of $9,000,000 monthly in the effort to relieve the housing conditions, would be hampered seriously by the embargo at a time declared the most critical in the city's history.

Bethlehem Trucks Are Shipped to England

ALLENTOWN, PA., Oct. 18—The Bethlehem Motors Corp. is shipping through the ports of New York and Philadelphia the first consignments of trucks to fill the $2,000,000 contract recently made in England. B. H. Hall, vice-president of the Bethlehem Corp. and director of the company's export activities, is authority for the statement that the order is for a total of 4,200 trucks of various capacities, to be shipped at the rate of twenty-five each week.

An advance of eight points in Bethlehem Motors stock on one day recently is believed to have been influenced by the enlarged production program.

Canadian Olds Plant to Operate January 1

LANSING, MICH., Oct. 22—The Olds Motor Works, Ltd., of Canada, a new General Motors unit established at Oshawa, near Toronto, will have its new plant ready for operation Jan. 1, according to announcement made here. All models of Oldsmobile cars and trucks will be produced and the output will be restricted to the Canadian field. The factory building consists of three stories and a basement and has 100,000 sq. ft. of floor space. General Motors has appropriated $450,000 for the construction and equipment of the new unit and the first years schedule calls for 5,000 machines of all models. All basic requirements of the new unit will be furnished from the local plant.

LARGE STUTZ SALES REPORTED

NEW YORK, Oct. 22—Net sales of the Stutz Motor Co. of Indianapolis, for the first six months ending June 30, 1919, are reported to have been $3,674,848. The yearly total will exceed $7,000,000.

First American Motorcycles Sold

Sales of American army automobile material in France have begun. The material for the first sale comprised American and English motorcycles

TRUCKS MEET NEEDS IN BRITISH STRIKE

Transport Problem Brought Greater Understanding of Car Possibilities

NEW YORK, Oct. 21—The recent British railroad strike brought an added impetus to motor transportation in that country, as is evidenced by the Manchester Guardian, copies of which, bearing the date of Oct. 1 and greatly delayed by the breakdown of rail communication, were received here today. The paper said:

"Today is the day of the motor lorry. What even the war could not do to make people realize what the new transport really is, the railway strike has done in two days. The whole country is dependent literally for its very life on the work of men who have struggled hard to get recognition for the internal combustion vehicle as a means of transport. No one but those actively engaged in commercial vehicle manufacture knows how long and severe the struggle against vested interests and ingrained conservatism has been. The only vehicle that can run the present blockade is the motor lorry and everybody knows it will not fail."

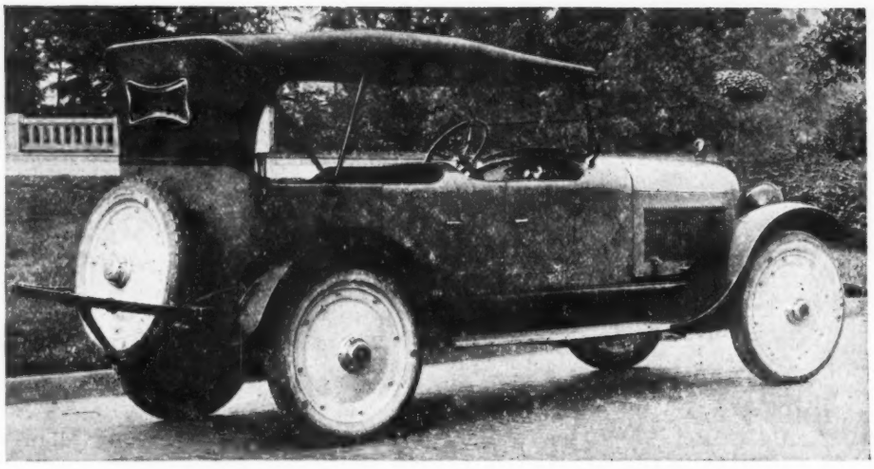
The transport problem, when the strike began, was tackled by the wholesale use of trucks from the government station at Slough, where they had been concentrated for disposal by public auction. Hundreds of these were dispatched to the Ministry of Transport at London and placed at the disposal of the Food Controller. Others were sent to various parts of the country where immediately needed. Motorcycles and airplanes likewise were put into service, their proposed sale being halted by the Disposal Board and rushed into service. Daily some 100 trucks were brought to Slough from the military depots in France and hastily put into running order. Mobile work and repair shops were sent out to keep the government trucks in operation.

The fuel situation was not serious, as the Disposal Board had thousands of tons of petrol, it was stated. This supply, of course, was quickly available for the food lorries that were run by volunteers, most of them demobilized soldiers.

Thousands Urge Use of the Metric System

SAN FRANCISCO, Oct. 16—More than 57,000 petitions urging President Wilson and national legislators to adopt metric standards—meter, liter, gram—for exclusive use in the United States have recently been received in Washington, D. C., as a result of the metric campaign of the World Trade Club of San Francisco and the American Metric Association of New York. Many of the most powerful organizations, including Chambers of Commerce, educational institutions and large manufacturing concerns from all parts of the United States, have sent in petitions urging this progress to standardized weights and measures.

At the same time, a scattering of petitions against the plan was received. These constituted less than one per cent of the total number of petitions. New petitions from organizations and eminent persons are coming in every day.



Two Disks in New Steel Wheel

Double disks of pressed steel, disk and rim being pressed out of one piece, make up the new wheel of the Reliance Wheel Co., of Youngstown, O. The disks are connected at the rim by a felloe band, through which eight belts pass. The air valve comes through the outer disk

Manufacturers' Assn. Elects New Members

NEW YORK, Oct. 18—At a meeting of the Board of Directors of the Motor and Accessory Manufacturers' Assn. at the New York offices yesterday, the following companies were elected to membership:

American Hammered Piston Ring Co., Baltimore, Md.; Chicago Steel Wheel Co., Chicago, Ill.; Corcoran Manufacturing Co., Cincinnati, O.; Iron City Products Co., Pittsburgh, Pa.; Lawrence & Co., New York, N. Y.; National Clutch Co., Inc., Irvington-on-Hudson, N. Y.; Roberts Brass Manufacturing Co., Detroit, Mich.; Schutte Body Co., Chas., Lancaster, Pa.; Sears-Cross Co., Brooklyn, N. Y.; Special Tool Engineering Co., Dayton, O.; Trexler Co., Philadelphia, Pa.; Wellman, Seaver, Morgan Co., Akron, O.

Among other firms elected within the past two months are the following:

General Asbestos & Rubber Co., Charleston, S. C.; Hudson Motor Specialties Co., Philadelphia, Pa.; McQuay-Norris Manufacturing Co., St. Louis, Mo.; Macbeth-Evans Glass Company, Pittsburgh, Pa.; Midwest Engine Company, Indianapolis, Ind.; Northwestern Chemical Co., Marietta, O.; Perfection Heater & Mfg. Co., Cleveland, O.; Story Rubber Company, New York City; Toledo Steel Castings Co., Toledo, O.; Triplex Safety Glass Corp. of America, New York City.

CLEVELAND TOP DOUBLES CAPACITY

CLEVELAND, OHIO, Oct. 21—The Cleveland Top & Specialty Co., manufacturer of automobile tops and specialties, with main offices and new factory at Carnegie Avenue and East Sixty-fifth Street, has doubled its production capacity.

Packard Co. Plans to Build More Trucks

DETROIT, Oct. 18—Nearly $1,750,000 is being invested by the Packard Motor Car Co. In order to increase production in its truck building department. A large manufacturing unit is in process of construction and will be completed soon. This addition is a three-story building having a floor space of 250,000 sq. ft. The Packard company is now running approximately twenty-five trucks a day and is aiming to run production up to 1,000 trucks a month.

TIRE COMPANY TO MOVE

STURGEON BAY, WIS., Oct. 20—The Racine (Wis.) Tire & Rubber Co. has opened negotiations with the Commercial Club of Sturgeon Bay, Wis., with a view of locating a branch factory and possibly remove its entire works and offices from Racine to Sturgeon Bay. The principal reason for the proposed transfer of operations is to locate in a more favorable labor market, Racine being acutely handicapped by shortage of housing accommodations.

MUST HAVE REBUILT TIRES

WASHINGTON, Oct. 17—Selling rebuilt or reconstructed automobile tires without "plainly and prominently indicating on the tire" that it is rebuilt or reconstructed, has been found unfair competition in violation of the law. The Federal Trade Commission has ordered the Akron Tire Co., Long Island City, N. Y., to discontinue the practice.

PRICES FOR GRANT MODELS

CLEVELAND, Oct. 19—Announcement was made here today of the price of $2,450 for the closed models of the new Grant Light Six line. Announcements of the features of this car gave the price of $1,495 for the open models.

TRANSPORT CORPS SHOWS EQUIPMENT

Cars and Motors that Helped Beat the Kaiser Are Exhibited

NEW YORK, Oct. 17—Many novel exhibits, including automotive equipment that has seen months of service in France, are shown at the Motor Transport Corps Exposition, which opened last night in the Ninth Regiment Armory.

The show has a twofold mission. It not only exhibits some of the automotive developments that are outgrowths of the war, but it has been effectively used to increase the maintenance efficiency of the Motor Transport Corps outfits that have manned the 600 motor trucks and other motor vehicles operated in and around New York during the war and since the armistice. Only those outfits that maintained an average of less than 10 per cent of its equipment in shop for repairs were allowed to enter exhibits. With this to spur them on the boys of the transport corps worked diligently to keep their equipment running, and a marked increase in the efficiency of many companies was attained.

As a result, the boys are now showing trucks that have run 6,000 miles and more, often carrying capacity loads, without visiting the repair shop. They stand on the armory floor today painted and polished and with every appearance of brand new stock.

This particular equipment will be examined by Col. A. Owen Seaman, Chief of Staff; Col. B. Taylor, Motor Transport Officer for the Eastern Department, and Lieutenant Colonel Collins. Prizes will be awarded to the motor truck companies showing equipment that has received the most efficient care during operation. The contest is confined mostly to Standardized Class B trucks of 3-ton capacity.

Among the decrepit relics of the motor equipment of the Kaiser's armies exhibited at the armory are the Crown Prince's field kitchen, still burnished from the use he put it to, German motor cycles weighing a ton apiece, a German ambulance captured by the 77th Division, and the only German monoplane of its type in captivity.

The exhibits include: Standardized motorcycles, photographic truck, armored motorcycles, Ford fire apparatus, the first to be used in France; searchlight trucks, telephone exchange, dental truck, machine shop truck, armored trucks, anti-aircraft guns on trucks, whippet tanks, and many cars of American design that saw war service in France and in the United States. Many of the American passenger vehicles have traveled 50,000 miles or more and are entered in a contest for vehicles in the best condition.

Women took a prominent part in the opening of the show. Members of the Red Cross, the Woman's Motor Corps of America and the National League for Woman's Service competed in assembling a motor. Music was furnished by bands from the 22nd Infantry, students from Governor's Island and from Fort Slocum.

The show was under the direction of Lt. T. B. O'Toole, Motor Transport Corps, U. S. A.

British Makers Plan Tractor Exhibitions

LONDON, Oct. 2—(Special Correspondence)—At the conclusion of the tractor trials at Lincoln, the Society of Motor Manufacturers & Traders, Ltd., has decided to give trials and exhibitions next September probably in the county of Lincolnshire again.

The success this year has led the promoters of the enterprise to believe that next year's exhibition will be the best of the kind ever held in either this country or in America.

New Maibohm Six Appears in Detroit

DETROIT, Oct. 22—The Maibohm six, a new 2395-lb. car, made its appearance in Detroit this week and is being distributed through Michigan by the Frank P. Gmelin Co. The snappy lines and leather finishings have attracted attention of prospective buyers and the success from the sales standpoint appears assured. This latest model is finished in green and sells for $1,395. The equipment is said to make it one of the easiest riding cars on the market and the light weight permits of a great saving in tire and gas mileage. On a recent trip from Sandusky to Cleveland, the car made 60 miles and stuck to the road with the grip of one twice its weight.

Body Builders' Shops Are Closed by Strike

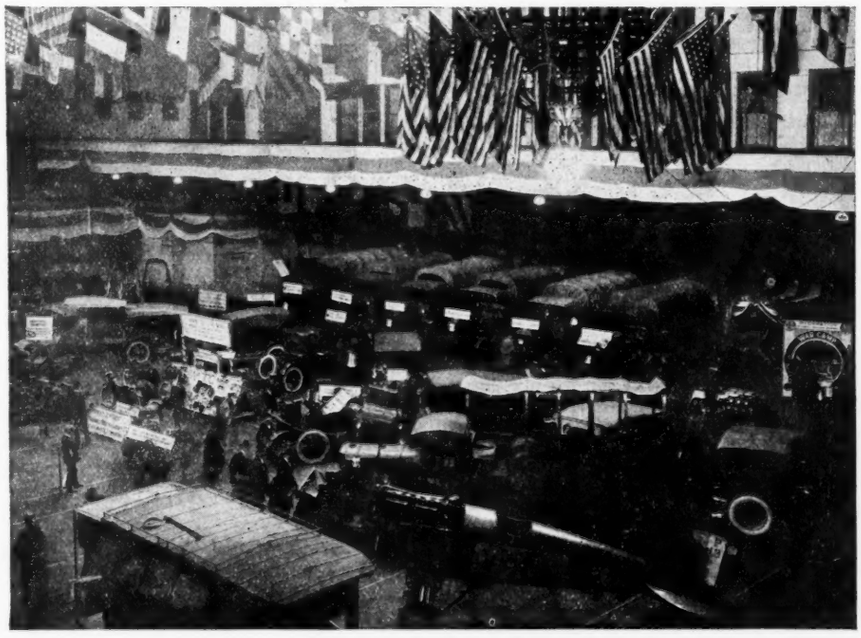
NEW YORK, Oct. 17—More than 100 automobile body and carriage builders in Manhattan are affected by the strike of 1,200 members of the United Automobile, Aircraft and Vehicle Workers of America.

With the exception of a few small plants, in which the men are said to have returned without concessions from the employers, there was no indication today of a change in the situation. Representatives of the employers who are tied up by the strike have said they will not recognize the union or treat with its officers because it was not affiliated with the American Federation of Labor.

The men walked out last Tuesday, without presenting demands, according to John Graham, representing the employers. Later they sent a letter to the employers demanding a forty-four hour week and a wage increase averaging about 15 per cent. The strike has not spread beyond Manhattan. Here the body builders' and dealers' service stations are idle, about 80 per cent of the shops of the body builders being affected.

LONDON-BRUSSELS AIR SERVICE

NEW YORK, Oct. 18—London newspapers received here today tell of the recent opening of the London-Brussels air service with equipment similar to that used on the previously opened service between the English capital and Paris. Trips each way will be made every other day, using Handley-Paige machines. Ten passengers, with 30 lb. each of baggage, in addition to 500 lb. of freight, can be carried on each trip. The service starts from London three days weekly.



In addition to the interesting automotive developments shown in the exposition at the Ninth Regiment Armory, New York, were several unique German vehicles. In the foreground is shown "Vera," the captured German monoplane, which the Americans turned against the Huns with great effect, during the Argonne operations

Parts Concerns Plan to Enlarge Plants

COLUMBUS, O., Oct. 22—Two Columbus parts concerns have undertaken to enlarge their plants and increase their capacity. The Columbus Auto Parts Co., which has been located at 215 East Russell Street, has decided to increase its authorized capital from $150,000 to $300,000 and erect a new plant with much additional machinery. The concern now employs 20 men and it is planned to double that number. It makes a full line of automobile hardware. Charles J. Krag is president; A. J. Pembroke and J. J. Stoddart, vice-presidents, and R. E. Klages, secretary, treasurer and general manager.

The Columbus Auto Brass Co., located at 767 North Fourth Street, has started the erection of a building to enlarge the enameling department. It will be completed and the machinery installed in about six weeks.

Henry A. Kroh, for many years southeastern district mechanical inspector for the Cadillac Motor Car Co., and later with the Lincoln Motor Co., has resigned to take charge of the new service station at the Cadillac agency at Charleston, S. C., as service manager.

Lee J. Eastman has been made president and general manager of the Packard Motor Car Co. of New York. He succeeds Roger J. Gilmore, resigned. He will make his headquarters at the Packard Building in New York City. His first venture in the automotive industry was as head of the Eastman Motor Truck Co. at Philadelphia in 1911, handling Wilcox trucks. Eastman next went with the Packard Motor Car Co. of Philadelphia in 1915. Three months later he succeeded E. B. Jackson to the presidency, Jackson coming to Packard, New York, as president and general manager.

Charles H. Reutelsterz has severed his connection with the Motor Materials Co., and the business in the future wil be conducted by Walter T. Roos. Reutelsterz has not announced his plans for the future.

Edward Tucker, Jr., formerly associated with the Detroit retail branch of the Cadillac Motor Car Co., has accepted a position with the Lafayette Motors Co., Indianapolis. Tucker has been a member of the Cadillac organization for six years with the exception of two years in the army. He served as first lieutenant in the air service.

W. J. Clucas has been made manager of the new Detroit sales office of the Lancaster Steel Products Co. of Lancaster, Pa. Clucas formerly was connected with the Standard Parts Co. of Cleveland.

Harry Shepler, formerly vice-president in charge of Overland production of the Willys-Overland Co., has been appointed production manager of the Rubay Body Co., Cleveland, which builds bodies for Packard and Pierce-Arrow cars.

Men of the Industry
Changes in Personnel and Position

Walter W. Smith, secretary and treasurer of the O. J. Beaudette Co., body manufacturer, Pontiac, Mich., has resigned. He retains his interest in the company, however, and his seat on the board of directors. He will spend the winter in California.

Edward Ver Linden, general manager of the Olds Motor Works, has purchased 80 acres of land adjoining the 50 acres he recently acquired as a site for the new foundry. Ver Linden said he considered the 80-acre tract a good real estate investment and aside from the fact that it was a good buy he declared he has no plans.

G. E. Anderson, formerly assistant to the vice-president of the American Locomotive Co., has been appointed assistant eastern sales manager of the Duff Mfg. Co., with headquarters at 50 Church Street, New York.

W. H. Haggard, division sales manager of the Emerson-Brantingham Co., Rockford, Ill., has retired. He has been connected with the implement, thresher and tractor industry for forty-eight years. His first experience with a manufacturing company dates back to 1885, with the Walter A. Wood Co. Later, he was appointed sales manager of the Rumely company, occupying that position for fifteen years. He was then made vice-president of Reeves & Co., and, when that concern was consolidated with the Emerson-Brantingham Co., he devoted his attention to general implement sales, particularly to the promotion of the tractor and thresher business.

REMMEL MFG. CO. INCORPORATED

KEWASKUM, WIS., Oct. 20—The gas engine and power farm machinery manufacturing business conducted for many years at Kewaskum, Wis., by Nicholas Remmel has been incorporated with a capital stock of $50,000 as the Remmel Mfg. Co. The foundry and machine shop will be enlarged and several new lines of products put into production during the winter. The incorporators are Nicholas Remmel, Otto E. Lay, B. H. Rosenheimer and George H. Schmidt.

NAVY TO SELL 200 SEAPLANES

WASHINGTON, Oct. 18—The Navy Department will sell 200 seaplanes and flying boats and a large number of engines and aircraft accessories.

Bids on much of this material were opened on Sept. 22 and those under the appraised value were rejected. Twenty-seven seaplanes and a considerable quantity of equipment were sold, out of a total of 219 seaplanes and flying boats and 441 engines that were offered.

JOINS WETMORE FORCES

MILWAUKEE, WIS., Oct. 20—The Wetmore Reamer Co., 210 Sycamore Street, Milwaukee, Wis., manufacturer of machine tools, announces the appointment of A. G. Gibbons, of Chicago, as production engineer. Gibbons formerly was connected with the Cadillac Motor Car Co., Detroit; Brown & Sharpe Mfg. Co., Providence, R .I., and more recently with Winslow Bros. Co., Chicago, as superintendent of tools and supplies.

DODGE BROS. BUYS LAND

DETROIT, MICH., Oct. 16—Dodge Brothers have bought 600 acres of land at Mt. Clemens. The tract has a north frontage on the lake and is on the Dixie Highway route from Detroit to Port Huron. No information has been given out as to the plans for utilization of the tract.

FOREIGN TRADE OPPORTUNITIES

WASHINGTON, Oct. 18—The Bureau of Foreign and Domestic Commerce, Department of Commerce, has received a number of requests for automobiles or parts agencies of business from individuals and companies in foreign countries. These are listed below. For further information address the Bureau of Foreign and Domestic Commerce and specify the Foreign Trade Opportunity number.

The representative of a firm in South Africa is in the United States for a short time and desires to purchase and secure agencies for manufacturers only of automobiles, etc. References. 30841.

A merchant in France desires to secure an agency on a commission basis for the sale of furnishings for automobile and carriage bodies. Correspondence should be in French. Reference. 30848.

The president of an American trading corporation is soon to sail for the Balkan countries and desires to secure agencies for the sale of automobiles, motors and machinery. References. 30858.

An agency is desired by a man in Italy for the sale of automobiles and gasoline. Correspondence should be in Italian. References. 30879.

An American firm with branch offices in Argentina, Brazil, Spain, Portugal, Italy and India desires to secure the agency for the sale of a high-priced, one medium and low-priced pleasure car; also for one light and one heavy motor truck, as well as a good tractor for agricultural work. Reference. 30906.

An agency is desired by a man in Italy for the sale of motorcycles and cheap automobiles. Correspondence should be in Italian. References. 30907.

A firm in New Zealand desires to purchase on consignment and secure the sole agency for the sale of motor accessories. Quotations should be given f.o.b. American port. Terms to be arranged but prefer 90 days' sight against documents. References. 30942.

A firm of manufacturers' agents in Colombia, having sample rooms and several commercial travelers, desires to represent on commission and consignment basis, automobiles, motor trucks and bicycles. References. 30956.

A firm in India desires to secure exclusive agencies for the sale of motor car, tires and accessories, and motor supplies of all kinds. Reference. 30951.

A Russian civil engineer desires to represent in Latvia (Lettland) American manufactures of automobiles. Correspondence may be in English. References. 30964.

Fisher Body Co. to Have Six-Story Plant

CLEVELAND, OHIO, Oct. 24—The Fisher Body Co. will have a six-story plant at Cleveland.

This marks the entrance of General Motors in Cleveland. The plant, containing 1,500,000 ft. of floor space and employing 7500 men, will be opened on completion of the building which already has been started. Conclusion of negotiations giving control of the Fisher Body Co. to General Motors was announced recently in Automotive Industries.

The Fisher Body Co., which started in Detroit 11 years ago with a capital of $31,000 and whose gross business the first year was $142,000, will do a $50,000,000 business this year, according to officials of the company, which now operates twenty-two plants at Detroit and one at Walkerville, Ont. The new building to be erected will be modern in every respect and equipment for the plant already is being manufactured at Detroit. The local plant will begin business with orders in excess of $20,000,000.

The company is said to be so far behind with its orders that no new accounts will be opened even after the plant here is in operation, although local buyers of Fisher bodies will be better protected with the local factory in operation.

NEW FACTORY STARTED

ST. LOUIS, MICH., Oct. 18—Work on the new factory of the Bollstrom Motors Co. will start this week. This is a new company organized to manufacture a four-wheel drive truck. The first factory unit will be 60 x 304 ft., one story high, and will be built of brick and concrete.

STANDARD PLANS EXPANSION

RACINE, WIS., Oct. 20—The Standard Foundry Co. of Racine, Wis., which specializes in gray iron castings for the automotive and implement industries, has increased its capital stock from $75,000 to $100,000 for the purpose of enlarging its plant and output. Arthur R. James is president, and Ernest L. Nrkvicka is secretary and treasurer.

MALLEABLE CO. GROWING

MILWAUKEE, WIS., Oct. 17—The Great Lakes Malleable Co., which recently established a new malleable casting plant specializing in automotive and commercial castings, is now in regular production at maximum capacity with a force of nearly 100 men. It already is necessary to double the size of the annealing building, completed a few weeks ago. Matthew Hoff is works manager. The plant occupies the site of the old Maynard steel foundries on Reed Street in Milwaukee.

DUPLEX EXPANDS

BROOKLYN, N. Y., Oct. 22—The Duplex Engine Governor Co., Inc., has opened a Pacific Coast branch at 17 Spear Street, San Francisco. H. C. Reynolds, who has been with the company for some time, will be the manager.

Current News of Factories

Notes of New Plants —Old Ones Enlarged

JORDAN BUYS PLANT

CLEVELAND, OHIO, Oct. 18—The Jordan Motor Car Co., Inc., has purchased the Metal Parts Mfg. Co. This factory, which adjoins the Jordan plant, will be used as a new Jordan production unit.

TO MANUFACTURE SPRINGS

DETROIT, MICH., Oct. 21—The Sampson Accessory Co. has incorporated in Michigan for $6,500, to manufacture metal products, including automobile springs and bumpers.

BRASS WORKS PLANNED

KENOSHA, WIS., Oct. 20—The Tri-Clover Machinery Co. has been organized at Kenosha, Wis., to manufacture brass specialties. The capital stock is $25,000. The organizers include L. C. Thomson, formerly of the Specialty Brass Co., Ole Rasmussen and Thorwald Jensen, who is retiring as superintendent of the brass department of the Winther Motor Truck Co. of Kenosha. A plant is now being erected and will be ready Dec. 1.

BUILDS NEW MACHINE SHOP

TOLEDO, OHIO, Oct. 20—The Lewis Steel Products Co., Toledo, Ohio, has let contracts for a new machine shop and foundry building, 150x375 ft., estimated to cost $250,000. Angelo R. Clas, formerly of the Falls Motors Corp., Sheboygan Falls, Wis., is president and general manager. His father, Alfred C. Clas, Milwaukee, Wis., is architect and engineer on the new construction project.

MAKERS ENTER N. A. C. C.

NEW YORK, Oct. 18—The Daniels Motor Car Co. of Reading, Pa., and the William Small Co., Indianapolis, makers of the Monroe, and the Templar Motors Corp. of Cleveland have been elected members of the National Automobile Chamber of Commerce.

G. M. C. ERECTING BUILDING

LANSING, MICH., Oct. 21—The Oldsmobile unit of the General Motors Co. this week began the construction of a new four-story office building, of brick and concrete, 50x300 ft., to house the officials and 300 clerks. A garage, 50x120 ft., will be erected contiguous to the administration building with storage space for 30 cars.

The new building will be ready for occupancy about June 1, when the present building wil be torn down to make room for a new fuel unloading system. The cost of the new administration building will be $533,000.

NEW PARTS FACTORY

CLEVELAND, OHIO, Oct. 18—The largest automotive equipment and light manufacturing plant in Cleveland will be opened as a result of the conclusion of negotiations whereby the Forester Realty Co. has secured a four-story reinforced concrete building nearing completion in the heart of the industrial section. The consideration was given as $750,000. The building will contain 250,000 sq. ft. of floor space, with a 27-ft. driveway the entire length of the building on one side. The Locomobile Co. has leased 60,000 sq. ft. of floor space and several other leases have been negotiated by equipment and accessory manufacturers.

SMITH CORP. ENLARGED

MILWAUKEE, WIS., Oct. 20—Work began today on the first of a series of extensions to the plant of the A. O. Smith Corp., Milwaukee, which will provide 400,000 sq. ft. of additional floor space within a year's time. The first building is 160x740 ft., of brick and steel, and will be second only to the present main shop of the Smith corporation as the largest factory building under one roof in Milwaukee. The existing shop is nearly 1250-ft. long. The Smith company has marketed an issue of $3,500,000 of gold notes to finance the enlargement.

OSHKOSH PLANT GROWS

OSHKOSH, WIS., Oct. 20—The Oshkosh Motor Truck Co., Oshkosh, Wis., manufacturing commercial cars employing an all-wheel drive system, has taken preliminary steps toward the erection of a complete new plant at High and Forest Streets, having outgrown the present plant, formerly that of the old Hayes Machine Co. With present facilities, the working force is limited to 75 operatives, although orders already booked require nearly twice that number of men and an output of at least one truck a day.

HACKETT MOTOR TO REORGANIZE

GRAND RAPIDS, MICH., Oct. 18—The stockholders of the Hackett Motor Car Co. will vote soon on a plan for reorganization of the company under the laws of Delaware the new plan contemplating a capitalization of $1,500,000 preferred stock of the par value of $10 and 300,000 shares of no par common stock. The outstanding shares in the present company will be exchanged on the basis of one share of preferred stock for each three shares in the old company, together with one share of common stock in the new company for each share in the present corporation.

PORTAGE DIVIDEND

BARBERTON, OHIO, Oct. 18—The Portage Rubber Co. has authorized the payment of its regular 3 per cent quarterly dividend on common stock of record Nov. 5, payable Nov. 15.

The construction of a three-story addition to the factory was also authorized. This will be of reinforced concrete and will cost approximately $200,000.

Calendar

SHOWS

Nov. 16-23—New York Automobile Salon, Hotel Commodore.

January—New York, International Automobile Mfrs.' Congress.

Jan. 3-10—New York, N.Y. Grand Central Palace, National Automobile Chamber of Commerce. S. A. Miles, Manager.

Jan. 3-10—New York City. Eighth Coast Artillery Armory, commercial cars and accessories.

Jan. 17-24—Cleveland. Nineteenth Annual Automobile Show, Cleveland Automobile Mfrs.' and Dealers' Assn., Wigmore Coliseum.

Jan. 24-31—Chicago, Ill. Coliseum. Cars: Drexel Pavilion. Trucks: National Automobile Chamber of Commerce. S. A. Miles, Manager.

Jan. 24-31—Chicago. International Amphitheater, commercial cars and accessories.

Jan. 31-Feb. 6—Kansas City, Mo. Annual exhibition, Overland Bldg. E. E. Peake, Manager.

Feb. 21-28—Ottawa, Ont. Motor Show.

Feb. 23-28—Louisville, Ky. Twelfth annual exhibition, Louisville Automobile Dealers' Assn., First Regiment Armory.

February—Chicago. International Automobile Mfrs.' Congress.

February—Deadwood, S. D. Annual show, Deadwood Business Club. F. R. Baldwin, Manager.

FOREIGN SHOWS

November—Christchurch, N. Z. First National Motor.

Nov. 7-16—London. Olympia Motor Car Exhibition — Society of Motor Mfrs. and Trades.

December — Brussels. International Automobile Mfrs.' Congress.

Dec. 19-Jan. 4—International Aviation Exhibition, Paris, France.

January — Glasgow. Scotland Scottish Motor Exhibition.

February — Manchester, Eng. North of England Motor Exhibition.

Feb. 23-March 6—Birmingham, Eng. British Industries Fair.

March—London, Eng. Motor Boat, Marine and Stationary Engine Exhibition.

March—Adelaide, Australia. All Australian Exhibition of motor vehicles, airplanes, engines and automotive equipment.

April or May — London, Eng. Commercial Vehicles Exhibition, Olympia.

April 3-May 4—Buenos Aires. Exposition of U. S. manufactures.

AUTOMOTIVE SHOWS AT FAIRS

Oct. 20-25—Raleigh, N. C. Cars, trucks and tractors.

Oct. 22-27—Shreveport, La. Cars, trucks and tractors.

Oct. 27-31—Columbia, S.C. South Carolina State Fair Assn.

Nov. 3-8—Phoenix, Ariz. Tractor Demonstration, Arizona State Fair.

TRACTOR SHOWS

Oct. 30—Yerington, Nev. Tractor demonstration, Lyon County Farm Bureau.

Nov. 22-29 — Jacksonville, Fla. Florida State Fair and Exposition. B. K. Hanafourde, Manager.

February — Kansas City, Mo. Fifth Annual Kansas City Tractor Club. Guy H. Hall, Manager.

Feb. 9-14—Wichita Kan. Tractor and Farm Machinery, Forum, Wichita Thresher-Tractor Club.

CONTESTS

Nov. 2-3—El Paso, Tex. El Paso-Phoenix road race.

Nov. 27—Los Angeles, Cal. Ascot Speedway race.

Dec. 29—Los Angeles, Cal. Ascot Speedway race.

August, 1920 — Paris, France. Grand Prix Race, Sporting Commission, Automobile Club of France.

CONVENTIONS

Oct. 27-28—Santa Barbara, Cal. State Automobile Trade Assn., Southern Division.

Oct. 29—Washington, D. C. Annual Labor Conference provided by Peace Treaty.

November—London, Eng. Road Transport Congress and Exhibition.

Nov. 3-8—Chicago, Ill. Convention, Automotive Equipment Assn., Medinah Temple.

Nov. 7-8—Detroit. Meeting of National Assn. of Motor Truck Sales Managers, Hotel Statler.

Nov. 10—Detroit. Service Managers' Convention.

Dec. 3-5—Cleveland. Ohio Automobile Trade Assn., annual convention.

January, 1920—Washington. Pan-American conference.

Feb. 9-13—Louisville, Ky. Seventeenth Annual Convention American Road Builders' Assn., Tenth American Good Roads Congress and Eleventh National Good Roads Show.

May 15-20, 1920—San Francisco. Seventh National Foreign Trade Convention.

SEAMAN BODY CORP. FORMED

MILWAUKEE, WIS., Oct. 20—The Seaman Body Corp., Milwaukee, Wis., has been incorporated with a capital stock of $200,000 as a development of the business of the W. S. Seaman Co., 480 Virginia Street, which is one of the largest builders of fine motor vehicle bodies in the Middle West. The concern was founded in 1910 and now operates two large factories in Milwaukee. Harold and Irving Seaman continue as principal officers and general managers under the reincorporation, which was made for the purposes of extensive enlargement of facilities and trade.

PRODUCTION INCREASED

LANSING, MICH., Oct. 18—The Gier Pressed Steel Co., of this city, exceeded its production record in September by 50 per cent, the entire output being designed for the automobile industry, including the tractor.

O. & S. BEARING MOVES

DETROIT, MICH., Oct. 19—The O. & S. Bearing Co., manufacturer of bearings and bushings, has moved into its new factory at 214 Artillery Avenue.

TWO NEW FIRMS IN MICHIGAN

DETROIT, Oct. 18—The Lynch-McNevens Sales Co. of Pontiac, with a capital of $10,000, and the Knight Metal Products Co., capitalized at $500,000, have been authorized to do business in Michigan. The former company will engage in the sale of automobiles and accessories and parts. The Knight company will deal in automobile accessories and attachments.

WALLIS TRACTOR NOW CASE

RACINE, WIS., Oct. 20—The name of the Wallis Tractor Co. has been changed to J. I. Case Plow Works Co. It is understood that the tractors made are to be listed under the trade name "Wallis" and the implements under the name "Case."

WISCONSIN CHARTER GRANTED

MILWAUKEE, WIS., Oct. 20.—The Interstate Oil & Equipment Co., a Delaware corporation with an authorized capital of $5,500,000, has been chartered to do business in Wisconsin. The representative is W. E. Krause, 214 West Water Street, Milwaukee.

MUST MAIL INVOICES

WASHINGTON, Oct. 20—After Oct. 30, cargo will not be passed by the Chinese Maritime Customs unless accompanied by invoices and other documents, according to a cable received by the Bureau of Foreign and Domestic Commerce from the Shanghai Consul General. The American Chamber of Commerce requests that the widest publicity be given urging American exporters to mail invoices so as to arrive with the cargo, thus keeping serious criticism from American trade methods.

PEACE EQUIPMENT PLANNED

WASHINGTON, Oct. 20—The War Department has decided that the peace time army organization will require 3,569 kitchen trailers, 15,951 motorcycles and 7,508 bicycles. All unserviceable vehicles found surplus after inventory has been made, will be disposed of.

WILL BUILD TRANSMISSIONS

WALKERSVILLE, ONT., Oct. 17—A new department has been added to the plant of Canadian Products, Ltd., a Canadian subsidiary of the General Motors Corp. here. Transmissions will be manufactured.